Sandpoint Ranger District
Noxious Weed Control Project
Draft Environmental Impact Statement

Little did Johnny Appleseed know that, one day, his cousin Irving Knapweed would become more famous than he.

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Draft Environmental Impact Statement

Sandpoint Ranger District, Idaho Panhandle National Forests
Bonner County, Idaho
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ABSTRACT

The Forest Service is proposing to control noxious weeds on 46 sites within the Sandpoint Ranger District. The objectives of the project are to:

- **protect the natural condition and biodiversity of the Pend Oreille Sub-Basin Ecosystem by preventing or limiting the spread of aggressive, non-native plant species that displace native vegetation;**
- **eliminate new invaders before they become established;**
- **reduce known and potential weed seed sources on trail heads and dispersed campsites, along main roads and trails, within powerline corridors, and in wildlife forage habitat (i.e. dry sites);**
- **prevent or limit the spread of established weeds into areas containing little or no infestation; and**
- **protect sensitive and unique habitats including research natural areas, wetlands, and sensitive plant populations.**

Three alternative courses of action have been developed to achieve these objectives. Alternative A would take no action to change the current weed management situation. Alternative B would combine mechanical, cultural and biological methods to control weeds. Alternative C would include the use of herbicides in addition to mechanical, cultural and biological control methods. The preferred alternative is Alternative C.

REQUEST FOR COMMENTS

We are requesting comments on this proposal and alternatives. **Comments must be received at our office listed above no later than 45 days following the Notice of Availability of this Draft Environmental Impact Statement (DEIS) in the Federal Register. We anticipate the Notice to be published no later than February 6, 1998. Therefore, our final date for accepting comments will be March 25, 1998**.

Reviewers should provide the Forest Service with their comments during the review period of the DEIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement (FEIS), thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewer's position and contentions (*Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978)). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the FEIS (*City of Angoon v. Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980)). Comments on the DEIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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Chapter I
Purpose and Need for Action

Introduction

This chapter defines noxious weeds, describes the locations of noxious and undesirable weeds in the Sandpoint Ranger District, and describes the need to control the spread of certain weeds. It also outlines the actions being proposed to address weed infestations within the Pend Oreille Sub-Basin Ecosystem.

Noxious Weeds Defined

Noxious weeds are those plant species that have been officially designated as such by Federal, State or County officials. In *Weeds of the West* by Whitson et al. (1992), a weed is defined as "a plant that interferes with management objectives for a given area of land at a given point in time."

The Federal Noxious Weed Act of 1974 defines a noxious weed as "a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States, or the public health" (P.L. 93-629).

The Idaho Noxious Weed Law defines a "noxious weed" as any exotic plant species that is established or that may be introduced in the State which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial uses and is further designated as either a State-wide or County-wide noxious weed (Idaho Code 24 Chapter 22).

Both Federal and State laws define noxious weeds primarily in terms of interference with commodity uses of the land. However, the impacts of weeds on non-commodity resources such as water quality, wildlife and natural diversity are of increasing concern.

Purpose and Need for Action

Noxious and undesirable weeds are spreading on public lands at an alarming rate. According to the recent scientific assessment of the Interior Columbia Basin, invading weeds can alter ecosystem processes, including productivity, decomposition, hydrology, nutrient cycling, and natural disturbance patterns such as frequency and intensity of wildfires (Quigley and Arbelbide 1997). Changing these processes can lead to displacement of native plant species, eventually impacting wildlife and plant habitat, recreational opportunities, grazing allotments and scenic beauty.

Noxious and undesirable weeds have established themselves throughout the Northwest and the Sandpoint Ranger District. Many weed species reproduce by sprouting from roots as well as by prolific seed production. Because of this, and because there is a lack of natural predators to keep them in check, weeds can spread rapidly to areas where their presence is not desired.

The spread of weeds can primarily be attributed to human activities associated with vehicles and roads (Roche and Roche 1991), contaminated livestock feed, contaminated seed, and ineffective revegetation practices on disturbed lands (Callihan et al. 1991). Birds and other wildlife also contribute to weed spread.

Vallentine (1989) explains that some of the worst current and potential noxious plant problems are caused by weed species such as Canada thistle, the knapweeds and dalmatian toadflax. All of these species are found in the Sandpoint Ranger District and have been expanding rapidly over the last several years.

A number of privately owned lands adjacent to Sandpoint Ranger District are used for hay

production and, to a lesser extent, livestock grazing. Noxious weeds have spread from existing state, county and federal road systems onto these lands. As a consequence, hay and seed producers suffer reduced yields, and many risk losing their valued weed-free status. Agricultural and other private landowners incur varying levels of expense in treating their weed infestations.

The degradation of public land resource values due to noxious weed infestations also has economic impacts. A study on the impact of spotted knapweed on Montana's economy (Hirsch and Leitch 1996) found that spotted knapweed infestations in wildlands there have affected wildlife-associated recreation expenditures and soil and water conservation benefits. Total direct impacts of knapweed infestations in wildlands on Montana's economy are estimated at $3.093 million annually, or $3.95 per infested acre. While there are no data for Idaho, similar per acre revenue losses are possible in wildland areas with heavy knapweed infestations, including the Sandpoint Ranger District.

State laws and County ordinances require that all landowners be responsible for control of noxious weeds on their lands. The state of Idaho and Bonner, Boundary and Kootenai Counties have been active in noxious weed control and eradication for several years. These entities have noxious weed control boards.

Noxious weeds may also have health impacts, which are discussed in greater detail in Chapters III and IV.

As the complexity of the weed issue has expanded and intensified, many individuals and government agencies realize there is a need to better respond to the noxious weed issue.

Project Objectives

The objectives of the Sandpoint District Weed Control Project are to:

- Protect the natural condition and biodiversity of the Pend Oreille Sub-Basin ecosystem by preventing or limiting the spread of aggressive, non-native plant species that displace native vegetation.

- Eliminate new invaders (weed species not previously reported in the area) before they become established.

- Reduce known and potential weed seed sources on trail heads and dispersed campsites, along main roads and trails, within powerline corridors, and in wildlife forage habitat (i.e. dry sites).

- Prevent or limit the spread of established weeds into areas containing little or no infestation.

- Protect sensitive and unique habitats including research natural areas, wetlands, and sensitive plant populations.

Proposed Action

The Sandpoint Ranger District proposes to control noxious weeds on 46 identified sites on National Forest lands in various locations throughout the District (see Table II-2). The word "control" refers to elimination or reduction for some weed populations, and slowing the rate of spread for others. Our site-specific resource objectives and goals determine the level of control we want to achieve for specific infestations.

An Integrated Pest Management (IPM) approach would be used. This approach uses a combination of control methods which include **mechanical control** such as hand-pulling, clipping, mowing, and burning weeds; **cultural control** such as fertilization, seeding and cultivation; **biological control** through the use of parasites and pathogens; and **chemical control** through the use of herbicides. **No aerial spraying of herbicides would occur.** The Proposed Action is presented as Alternative C in this EIS.

The area proposed for treatment totals less than one percent (1.0%) of the 315,420 acres in the Sandpoint Ranger District. Sites range in size from single plants to infestations covering about 300 acres. In many areas the weed infestation does not involve 100 percent of the ground. For instance, a dispersed camping area approximately two acres in size might be infested with weeds but the amount of land actually occupied by weeds would be in scattered clumps covering only a few feet square. Therefore, actual control efforts for noxious weeds may be confined to a smaller area than that reflected in the total infestation acreage (see Table II-2).

At least 19 weed species are considered for control measures. The major species include meadow hawkweed (*Hieracium pratense*), spotted knapweed (*Centaurea maculosa*), orange hawkweed (*Hieracium aurantiacum*), dalmatian toadflax, (*Linaria genistifolia* ssp. *dalmatica*), Canada thistle (*Cirsium arvense*), goatweed(*Hypericum perforatum*), rush skeletonweed (*Chondrilla juncea*), ox-eye daisy (*Chrysanthemum leucanthemum*), sulfur cinquefoil (*Potentilla recta*) and common tansy (*Tanacetum vulgare*). Other species may include diffuse knapweed (*Centaurea diffusa*), purple loosestrife (*Lythrum salicaria*), yellow starthistle (*Centaurea solstitialis*), musk thistle (*Carduus nutans*), bull thistle (*Cirsium vulgare*), houndstongue (*Cynoglossum officinale*), tansy ragwort (*Senecio jacobaea*), Scotch broom (*Cytisus scoparius*) and leafy spurge (*Euphorbia esula*). Appendix H describes characteristics of the above species.

First-year treatments would likely not be 100 percent effective for weed control, since dormant seeds in existing populations germinate in following years. Therefore, follow-up treatments would be needed, in most cases for up to three years; such treatments would likely be at reduced levels, especially with the use of herbicides.

As additional infestations are discovered in the next five years, each site would be evaluated to determine if the site fits within the scope of this EIS and then prioritized for treatment. Those sites selected for control would be treated using the parameters established and the analysis conducted in this EIS. Treatment of additional sites would be under an adaptive strategy described in Chapter II and illustrated in Appendix G.

Although private lands are not included in the proposed action, there may be opportunities for cooperative efforts with private landowners to control noxious weeds on lands adjacent to National Forest.

Management Direction

Relationship to the Forest Plan - Activities that are planned in the National Forest System involve two different levels of decisions: a general (programmatic) decision for the entire Forest and a site-specific decision for the project area.

The programmatic decision is the Forest Plan that provides overall direction under which the Idaho Panhandle National Forests (IPNF) will be managed. The IPNF began implementation of its Forest Plan in September, 1987. The Forest Plan Final Environmental Impact Statement (FEIS) contains a general cumulative effects analysis of anticipated actions on a landscape level for such resource values as roadless areas, wildlife populations, and water quality of major drainages. The Forest Plan also establishes standards that preclude or limit actions to protect the environment. These standards are used to develop mitigation measures for the proposed action and alternatives. They are also used to measure the actions' effects to ensure that those actions are in compliance with the Forest Plan.

This EIS is the site-specific decision level for implementing activities. The Sandpoint Noxious Weed Control Project is tiered to the IPNF Forest Plan FEIS to allow the EIS to focus on specific issues pertaining to the project area. The Sandpoint Noxious Weed Control Project EIS is not a general management plan for the project area or a

programmatic environmental assessment. It is a **site-specific** linkage between the Forest Plan and requirements established by the National Environmental Policy Act (NEPA).

This decision level involves analyzing site-specific proposals, as well as disclosing their environmental effects, to achieve the general guidelines of the Forest Plan. This information will be used by the Responsible Official (the Sandpoint District Ranger) to make a choice for managing the project area. Refer to the Forest Plan (p. IV-3 through IV-5) for additional information about the relationship between forest planning and Environmental Impact Statements.

The IPNF Forest Plan provides the following objective for implementing an Integrated Pest Management (IPM) program: "Noxious weed control will be based on an integrated pest management approach, which includes, but is not limited to, the current practices of inventory, monitoring, some hand-pulling, and some biological control. Noxious weed control will be conducted in cooperation with counties, other agencies, and private landowners...priority will be given to small infestations of species new to an area, where moderate control actions have a good chance of preventing the establishment of new problems" (IPNF Forest Plan, pp.II-7 to II-8).

Idaho Panhandle National Forests Weed Management Philosophy

The IPNF uses IPM principles in managing various pests, including noxious weeds. These principles are defined in the Forest Service Handbook FSH 3409, on Forest Service Pest Management. Strobel (1991) and Ralphs et al. (1991) describe that a fully integrated approach is necessary in weed management because using only one management method will not work.

A variety of activities can be carried out under an IPM program. IPM provides a full range of management alternatives. Inventory, monitoring, and public education are also part of IPM activities. Effective use of the program requires that the Forest Service prioritize treatment activities. The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally uninfested areas. The 1989 Final EIS for Weed Pest Management, Idaho Panhandle National Forests describes the management strategy.

Supporting Documents and Analyses

The potential impacts of proposed weed treatment activities are analyzed in this Environmental Impact Statement (EIS). This EIS will incorporate by reference the guidelines, findings and analysis described in the following documents: the Forest Service Noxious Weed Policy, December, 1995; the Idaho Panhandle National Forests Weed Pest Management EIS, October, 1989; the Idaho Panhandle National Forests Land and Resource Management Plan (Forest Plan), September, 1987; the Final EIS Noxious Weed Management Project, Bonners Ferry Ranger District, September, 1995; and the Priest Lake Noxious Weed Control Project Final EIS, February, 1997. Those documents are available for review at the Sandpoint Ranger District office. Findings not covered by those documents will be addressed by this EIS.

Decisions to be Made

Following a public review of the draft EIS, the Deciding Official will issue a Final EIS and Record of Decision (ROD). The ROD will document what actions, if any, should be taken to control weeds on National Forest lands in the Pend Oreille Ecosystem, where treatment should be applied, what type of treatment(s) should be used, and when treatment will occur.

Chapter II
Alternatives

Introduction

This chapter describes the public involvement and issue development processes used to design and develop alternatives to the proposed weed treatments. Environmental issues identified by the public and agency personnel are described. The proposed action and alternatives are described and compared. Features, or design criteria, of the alternatives are also discussed.

Public Involvement

The public has been involved throughout the development of this EIS. Public comment has helped to define issues and develop the range of alternatives for accomplishing management goals and objectives.

To inform the public about the Noxious Weed Control Project, a Notice of Intent was published in the Federal Register on January 31, 1997. On February 19, 1997, a Scoping Notice was mailed to 282 individuals, organizations, and agencies. A news release was sent to local newspapers and radio stations on February 20, 1997. A news report was aired on KPND radio in Sandpoint on February 26, 1997. An article appeared in the Bonner County Daily Bee on February 28, 1997. We received a total of 34 responses in the form of letters, phone calls and visits.

The public comments and results of the content analysis are contained in the project file at Sandpoint Ranger District.

Issues

Analysis of public and internal comments resulted in the following list of issues that guided the development of alternatives. Each issue is stated and is followed by a synopsis of the specific responses received from the public. A brief discussion of how each issue is addressed in the EIS follows the synopsis of public comments.

1. Current and potential impacts of the spread of noxious weeds on the physical, biological and ecological environment within the Sandpoint Ranger District.

The issue of noxious weed spread has become of increasing importance to the Forest Service as weeds continue spreading throughout the National Forests at an alarming rate. There are concerns within the Forest Service and from individuals who commented that noxious and undesirable weeds compete with native vegetation and impact wildlife, watersheds and forest vegetative biodiversity.

In this document, several factors will be used to measure the effects of weed spread on various components of the environment. Effects on vegetation will be measured by the number of acres that would be treated and by the impacts of weeds on native plant communities, including sensitive plant habitats. Effects on aquatic resources will be measured by the impacts of weeds on water quality, volume of runoff and sediment yield, as well as whether those impacts would be within acceptable limits for fisheries. Effects on wildlife will be measured by the impacts of weeds on habitat for forage-dependent species (elk, white-tailed deer and grizzly bear).

2. Economics, effectiveness, and potential impacts of various weed control methods on natural resources.

Although most commenters acknowledged the potential threat of noxious weeds, many had concerns about various methods of treatment. Some commenters were concerned about the impact of herbicides on biological resources

and water quality. Others were interested in the use and effectiveness of biological control methods. Some people questioned the effectiveness of our proposal on a long-term basis, and associated costs of carrying out the program. Others advocated a full range of control measures, specifying that we try to use as integrated an approach as possible.

Factors that will be used to measure these issues will include the cost of implementing each of the alternatives and the predicted effectiveness of each alternative (methodology for cost determinations is displayed in Appendix F). Effects on vegetation will be measured in two ways: impacts of treatment methods on desired plant species, and effectiveness of treatment methods in controlling weed populations. Effects on aquatic resources will be measured by predicted changes in water quality, volume of runoff and sediment yield, as well as whether those changes would be within acceptable limits for fisheries. Effects on wildlife will be measured by effectiveness of weed control methods in habitat for forage-dependent species, and by impacts of weed control activities on wildlife species.

3. Potential effects on human health from the application of herbicides.

Some commenters were specifically concerned about the impact on human health of weed control with herbicides.

Factors that will be used to measure this issue include quantities of herbicide proposed for use, proposed methods of herbicide application, and potential effects on project workers, nearby residents and visitors to the project area.

A full range of alternatives is developed in this chapter to address these concerns. Environmental and economic consequences of the alternatives are presented in Chapter IV.

Issues Dropped From Consideration

<u>Effects of Logging and Road Building on Weed Spread</u> - One commenter stated that the Forest Service should address prevention of noxious weed spread by analyzing the effects of new ground-disturbing activities on weed spread. The purpose of this document is to address some of our current weed infestations and to provide guidelines for future treatment of other infestations. Although new roads and logging contribute to the spread of noxious weeds, they are not the only cause. While it is valid to consider the impacts of logging and road building on the spread of noxious weeds, the issue is beyond the scope of this project's analysis. Instead, the issue is addressed in the analysis of each project which proposes those activities.

<u>Effects of Livestock on Weed Spread</u> - One individual questioned whether livestock played a role in the spread of noxious weeds. The Sandpoint Ranger District has had very little grazing activity over the last 10 years, so grazing has not been a large contributing factor to noxious weed spread. For that reason, this issue was dropped from further consideration.

Methods Available for Noxious Weed Control

Methods available for noxious weed control vary and are largely dependent on how each weed species responds to a particular type of treatment. Treatment methods available for each weed species under consideration are listed in Appendix H. Types of weed control include:

Mechanical Control

Mechanical control methods range from hand-pulling and grubbing with hand tools to clipping or mowing the plants with scythes or other cutters. If sufficient root mass is removed, the individual plant can be destroyed. Cutting the plants can reduce reproduction in perennial species and weaken their competitive advantage by depleting

carbohydrate reserves in the root systems. Mechanical control could also include burning the plants with a propane torch.

Small infestations of some weed species can be controlled by mechanical methods, while larger infestations are more difficult to control. In addition, several weed species will respond to mechanical treatment with aggressive resprouting from even small root fragments left in the soil. Mechanical control often must be repeated several times a year for many years to successfully eradicate weed species that are prolific seed producers.

Cultural Control

Cultural control generally involves manipulating a site to increase the competitive advantage of desirable species and decrease the competitive advantage of undesirable species. Manipulations could involve planting native and desired non-native species to shade out weeds, or covering weed-seed contaminated soil with a layer of uncontaminated soil. Seeding grass species and applying fertilizer on sites where ground cover is sparse could help to culturally control some weeds. Seeding and fertilization are most effective after existing weed populations have been treated to reduce their competitive advantage.

Biological Control

Biological control is the use of other living organisms such as insects or fungi to attack undesirable plant species. Populations of native plant species are generally kept from spreading out of control by natural limiting factors such as predators (animals, insects), diseases, and competition for nutrients and moisture. Non-native vegetation has become a problem in many parts of the West due to a lack of such limiting factors. The introduction of biological control agents is viewed by most experts as the best long-term solution to the noxious weed problem where there are large, widespread populations of a given species. Under ideal circumstances, control agents reach a dynamic equilibrium with target weed species.

Before introducing new biological control agents into the United States, their host-specificity is tested. The agents are placed with a wide variety of plant species under "eat-or-starve" conditions to ensure that their attack is confined to a narrow range of plant species, preferably to the weed of concern.

Biological control is most effective when used in combination with or prior to other treatment methods. By themselves, biological control agents do not completely eradicate noxious weed infestations. A biological control strategy alone might decrease production of viable weed seed, and may slow the rate of spread of some species. The benefits of biological control are often not realized for many years.

Detailed descriptions of available biological agents are included in the project file.

Chemical Control

Chemical control involves the application of herbicides to weed species at certain stages of plant growth. Herbicides kill the treated plant, but often allow remaining seeds to germinate. A description of herbicides available for use is included in Appendix C.

Site conditions such as vegetation types, soil types, weed species composition and infestation levels may vary significantly on any given treatment site. Therefore, a combination of chemical and non-chemical methods is often preferred for weed control. The selection of chemical methods for a site does not preclude the application of other methods, either concurrently or as follow-up treatments, on that site.

Control With Mixtures Of Herbicides

Many control specialists treat several noxious weed species with mixtures of chemicals. There are several reasons for using a mixture of chemicals. Sometimes one chemical by

itself will not be effective against a certain weed species, but combining two chemicals may provide better control (Callihan 1989, Vallentine 1989, Ralphs et al. 1991, Lacey et al. 1995). Depending on the biology of the weed, the environment in which it is growing, and the infestation size, sometimes a mixture of two is needed. This is the case for weeds that are somewhat resistant to an individual herbicide.

Applicators can use mixtures to reduce the number of applications required to control resistant weeds. For example, a mixture of picloram and 2,4-D is used for many weed species (Monnig 1988). Both herbicides are broad leaf-selective but inhibit the plant in different manners. 2,4-D generally has a shorter half-life, while picloram provides longer persistence. Together these two herbicides provide weed control that may not be accomplished by either herbicide alone. The addition of 2,4-D to picloram also reduces the amount of picloram to half of what is normally applied, therefore minimizing effects to non-target plant species.

Alternatives Considered in Detail

Three alternatives were developed to address public and internal issues. These alternatives represent the range of control methods currently available for treatment of noxious and undesirable weeds. In addition to the No Action Alternative (Alternative A), one alternative involves only non-chemical methods of control (Alternative B), and the other alternative involves both non-chemical and chemical methods of control (Alternative C, the Proposed Action). The comparison of Alternatives B and C defines the issue of potential environmental and human health effects of herbicide use. Analysis of the No Action alternative discloses the consequences of unchecked expansion of weeds in forest ecosystems. The alternatives are outlined below with a brief discussion of the major issues relevant to each.

Features Common to All Alternatives

<u>Noxious Weed Prevention and Control</u>

1. Certified weed-free feed is now required for use on all National Forest lands in Sandpoint Ranger District (36 CFR 261.50).

2. Cleaning of equipment used for forest activities would be required before operating within all areas previously treated for noxious weeds or within areas currently considered weed-free. Clause 10.2 or CT 6.26 would be included in contracts associated with those areas.

3. To prevent the establishment and spread of noxious weeds, all ground disturbances resulting from management activities would be revegetated with an appropriate, certified noxious weed-free seed mix and fertilized as necessary.

4. Cultural control would be considered for all sites following weed treatment. After weeds have been eradicated or reduced in distribution to acceptable levels, revegetation with more desirable species is often necessary to prevent reinvasion by the weeds. Native and desired non-native species would be used for revegetation.

5. All noxious weed control activities would comply with state and local laws and agency guidelines.

Features Common to Alternatives B and C

<u>Noxious Weed Prevention and Control</u>

1. All gravel pits in Sandpoint Ranger District would be treated for noxious and undesirable weeds.

2. Provisions would be made for the prevention and control of weeds within

new and existing special use permits as needed.

3. Weed control would occur at developed campgrounds, trailheads and high-use, dispersed campsites following the standards and guidelines outlined in this document.

4. All weeds which are mechanically controlled would be bagged and disposed of to be burned at designated sites.

5. New noxious weed invaders, as identified by local and state agencies, would be given high priority for treatment as funding is available.

6. Additional biological control agents may become available for use. Before such agents are released, their effectiveness, and any impacts to other resources, would be evaluated.

Public Safety

1. An annual operating plan outlining proposed treatments would be available to the public at the Sandpoint Ranger District office.

2. Adjacent landowners would be notified prior to treatment of noxious weeds on National Forest lands.

3. Traffic control and signing during weed treatment operations would be used as needed to ensure safety of workers and motorists.

Resource Protection

1. For weed treatment within grizzly bear recovery areas, administrative use guidelines would be followed (see project file).

2. All weed treatment would be coordinated with the North Zone Botany Coordinator. Site-specific treatment guidelines, approved by the Forest Botanist, would be developed for infestations within or adjacent to known sensitive plant populations. All future treatment sites would be evaluated for sensitive plant habitat suitablity; highly suitable habitat would be surveyed as necessary prior to treatment.

Adaptive Strategy

Alternatives B and C include an adaptive strategy for future treatment of additional sites as new infestations are discovered. Infestations known to occur in the project area but not previously quantified would also be inventoried, and site-specific recommendations for treatment would be made. Priorities for treatment would be established based on weed species present, infestation size and vulnerability of recreational, wildlife, aquatic and special vegetation resources to the infestation.

Treatment methods for each site would be selected based on weed species ecology, cost-effectiveness of the treatments and the management objective for the site (e.g. eradication or reduction of seed production). Proposed treatments would be evaluated to determine if they fit within the scope of this EIS relative to the issues analyzed.

In addition, monitoring of treatment sites would be conducted. Assessment of the effectiveness of control efforts would consider the weed management objective for each site, as well as the infestation size and percent occupancy of the target weed species following treatment.

See Appendix G for a flow chart which illustrates the decision process to be followed in applying the adaptive strategy.

Alternative A: No Action

This alternative would not result in a change in current noxious weed control activities in Sandpoint Ranger District. Current strategies for noxious weed control as outlined in the

Idaho Panhandle National Forest Plan (1987) and the Idaho Panhandle National Forest Noxious Weed Environmental Assessment (1989) would still be considered the primary strategy. Noxious weed control would consist mostly of mechanical methods and preventive cultural practices such as seeding disturbed areas. Release of biological control agents would occur on a limited basis. Essentially, only administrative sites such as the Grouse Creek Tree Improvement Area would be treated using a fully integrated pest management approach.

Aggressive control of weed infestations at the 46 identified sites would not occur. There would be no adaptive strategy to plan for eradication of new invaders or to adjust treatment needs if site conditions in existing infestations change.

Control efforts would likely be confined to future timber sale project areas and would rely largely on funds generated from timber sale receipts. Proposed weed treatment would be addressed on a project-by-project or site-by-site basis, but with no overall district strategy or prioritization. New noxious weed invaders would be treated as they are detected and as funding permits. Herbicide use on new invaders would be limited to the Sandpoint Ranger District's portion of the five-acre Forest-wide annual allowance under the IPNF Forest Plan.

Under this alternative, most noxious weed species would be considered an established part of the ecosystem.

Because Alternative A does not include proposed treatments for specific sites, it would not be possible to predict the overall cost of its implementation. Sandpoint Ranger District spent $6,553 on noxious weed treatment in 1993 and $1,501 in 1994 (McConnaughey 1998). Future expenditures under this alternative would likely reflect this trend.

Alternative B: Mechanical, Cultural and Biological Treatment

This alternative would use an integrated approach to control noxious and undesirable weeds. Treatments such as hand-pulling, clipping and mowing would be supplemented with cultural methods such as seeding, fertilizing and planting. Release of biological agents (parasites, predators or pathogens) that have shown promise in reducing weed infestations would also be used.

No herbicides would be used. Initial treatment methods proposed for each site under this alternative are listed in Table II-1.

The predicted cost for full implementation of this alternative would be approximately $157,266 in the first year, $150,146 in the second year, and $105,985 in the third year, for a total cost of $413,397.

Biological Control The use of biological control agents alone would occur on four treatment sites covering approximately 507 acres. Follow-up monitoring, and additional biological control release as needed, would be conducted to ensure the biological agent establishes over the entire infestation.

Cultural Control Cultural control alone would be used at two sites. At one site of approximately five acres, weed species are colonizing an insufficiently-revegetated closed road prism. The site would be planted with conifers, seeded and fertilized to help eventually shade out the weeds. The second site encompasses approximately 100 acres of riparian habitat which was logged in the early 1900s. Efforts to reforest the site initiated in 1993 would continue.

Mechanical Control This single treatment would be used on 33 sites covering approximately 86 acres, with 26 acres of actual treatment. In most cases, weeds would be hand-pulled and disposed of as specified in the design criteria; on one site, weeds would be burned with a propane torch.

Biological and Cultural Control At this time, a combination of biological and cultural control is not proposed for any treatment sites within the project area. However, this combination of methods may be used in follow-up treatments.

Mechanical and Biological Control This combination for treatment methods would occur on seven sites covering approximately 572 acres, with about 540 acres of treatment.

Mechanical and Cultural Control At this time, a combination of mechanical and cultural control is not proposed for any treatment sites within the project area. However, this combination of methods may be used in follow-up treatments.

Adaptive Strategy

All design criteria pertinent to Alternative B would apply to new treatment sites as well as to follow-up treatments on the above 46 sites. Subsequent treatment efforts may vary over time, but would only include mechanical, cultural or biological methods.

Alternative C: Mechanical, Cultural, Biological and Chemical Treatment

Alternative C is the Proposed Action as described in Chapter I. This fully integrated approach would initially rely more heavily on biological control and herbicides to significantly reduce weed populations in some cases and to eradicate populations in other cases. Subsequent treatment would rely progressively less on these methods as larger populations are reduced.

Initial treatment methods proposed for each site under this alternative are listed in Table II-2. Subsequent treatment efforts may vary over time; initial treatment with herbicides would not preclude concurrent or follow-up use of other treatment methods.

The predicted cost for full implementation of this alternative would be approximately $95,385 in the first year, $86,181 in the second year and $45,275 in the third year, for a total cost of $226,841.

Herbicide Control The use of herbicides alone would occur on 31 treatment sites covering approximately 132 acres. Actual treatment is anticipated on about 73 acres. Five herbicides (dicamba, clopyralid, picloram, metsulfuron methyl and 2,4-D amine) would be considered for application on various sites. Two chemicals were approved for use in the 1989 IPNF Weed Pest Management EIS (2,4-D and picloram).

The use of each herbicide would depend on the weed species, level of infestation, location, other resource concerns, and applicability of the herbicide. See Design Criteria Specific to Alternative C for chemical use guidelines.

The application of herbicides would follow the general application guidelines outlined in Appendix D. Application would be with a backpack sprayer, manual dispersal of pellets, or with a pumper unit mounted on the back of a pickup truck. There would be no aerial application of herbicides.

Herbicide and Biological Controls This combination of control methods would be used on 7 treatment sites involving approximately 572 acres. Treatment would total almost 540 acres (47 acres with herbicides and 493 acres with biocontrol agents). Herbicides would be used in areas within a site with a low to heavy concentration of weeds that can be feasibly treated with either a backpack sprayer or pumper unit (i.e., on or near roads and trail prisms). Biological agents would be used within areas where herbicide application would be costly, time consuming and/or ineffective (an example would be where weeds have moved off the road or trail and are widespread in the general forest).

Herbicide and Mechanical Control This combination of noxious weed control would be used on two treatment sites encompassing

1.25 acres. A total of 0.40 acres of noxious weeds would be treated (0.25 acre with herbicides and 0.15 acre by mechanical methods). Mechanical control would be used on individuals or small infestations where there is confidence that the species can be eradicated. Herbicide use on the same sites would target weed species with larger infestations, or where mechanical control would not be effective.

Mechanical and Biological Controls At this time, we do not propose to use a combination of mechanical and biological control on any treatment sites within the project area. However, this combination of methods may be used in follow-up treatments.

Mechanical Control This single treatment would be used on two sites covering 10.05 acre, with 10.05 acres of actual treatment.

Biological Control Biological control alone is proposed on two sites, comprising a total of 450 acres. As with Alternative B, follow-up monitoring, and additional release of biological agents as needed, would be conducted to ensure the biological agents establish over the entire infestation.

Biological and Cultural Control At this time, we do not propose to use a combination of biological and cultural control on any proposed treatment sites within the project area. However, this combination of methods may be used in follow-up treatments.

Mechanical and Cultural Control At this time, we do not propose to use a combination of mechanical and cultural control on any proposed treatment sites within the project area. However, this combination of methods may be used in follow-up treatments.

Cultural Control Cultural control alone is proposed for two sites; at one site of approximately five acres, weed species are colonizing an insufficiently-revegetated closed road prism. The site would be planted with conifers, seeded and fertilized to help eventually shade out the weeds. The second site encompasses approximately 100 acres of riparian habitat which was logged in the early 1900s. Efforts to reforest the site initiated in 1993 would continue.

Adaptive Strategy

Two additional herbicides, glyphosate and triclopyr, are not currently proposed for use; they are included in this analysis for potential future use.

All design criteria pertinent to Alternative C would apply to new treatment sites as well as to follow-up treatments on the above 46 sites. In addition, any herbicide use proposed on new treatment sites, or as follow-up treatments on the above 46 sites, must meet the requirements of parameters established by the project aquatics specialist. The parameters require that the combined treatments in any drainage result in a concentration of herbicide in surface water lower than the no-observable-effect level (NOEL) rate for each given treatment year (see Chapter IV, Soils and Aquatic Resources). The maximum number of acres which could be treated with a given herbicide in each drainage each year is displayed in Appendix J. The methodology used in the determination of maximum treatment acres can be found in the project file.

If any proposed herbicide application would exceed the established parameters, treatment would be deferred, or an alternate weed control method would be selected. When a combination of herbicides is proposed for use, the maximum herbicide treatment acres for a given drainage would be those for the most restrictive herbicide.

Design Criteria Specific to Alternative C:

<u>Herbicide Use - General</u>

1. If future development of herbicides results in products which promise to be more effective, their use would be evaluated for impacts to resources analyzed in this EIS.

2. All herbicide use would comply with applicable laws and guidelines.

Herbicide Use - Public Safety

1. Treatment areas would be signed prior to and following herbicide applications within areas of special concern. In addition, information on where and when spraying and other treatments would occur would be available to the public at the Ranger District office.

2. Application of herbicides to treat noxious weeds would be performed by or directly supervised by a State licensed applicator.

3. Procedures for mixing, loading and disposal of herbicides as outlined in Appendix E would be followed.

4. Procedures for a spill plan for hazardous materials as outlined in Appendix E would be followed.

5. The guidelines for safe application for individual herbicides as outlined on label requirements and also by State and Federal Laws would be followed.

6. All herbicide applications would be ground-based; there would be no aerial application of herbicides.

7. Special use permittees would be notified in advance of treatments on their permit sites and advised of herbicide label requirements regarding use of treated lands.

Resource Protection

1. Any application of herbicides would adhere to FSH 2509.22- Soil and Water Conservation Practices Handbook, 13.07-13.13.

2. Within 50 feet of any known sensitive plant occurrences, the preferred method of weed control would be either mechanical control or hand spray. No vehicle-based herbicide application would occur (Appendix D).

Alternatives Considered But Dropped

Control with grazing

Grazing by sheep and goats provides another non-chemical alternative of control that may be applicable to large infestations of some weed species. However, because most treatment sites are located on roads and at trailheads and other high-use locations, control through grazing is not practical at this time.

Control Using Boiling Water

One commenter suggested that use of boiling water on weeds would kill the plants. Given the logistical difficulty of implementing this treatment method over often large and remote weed infestations, it was dropped from further consideration.

Control of Other Exotic Species

The Forest Service acknowledges that other exotic species exist on National Forest lands. Dominant species include orchard grass (*Dactylis glomerata*), common timothy (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*) and several species of clover (*Trifolium* spp.). Many of these were intentionally introduced by seeding activities for erosion control. These species generally inhabit small areas. Under ideal circumstances they would not be present in the forest ecosystem. Fortunately, these species are relatively non-aggressive, and grazing by wildlife has suppressed them. Eradication of these non-native species would require intensive soil disturbance practices frequently seen in farming communities across the West. The Forest Service will continue efforts to keep these species from spreading. These efforts include, for example, revegetating disturbed areas with appropriate native and short-lived non-native species to reduce the potential impact on native plant communities.

Table II-1. Alternative B: Mechanical, Cultural and Biological Treatment

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
1	Trail 217	Harrison Lake Trail	T61N R2W SEC 5	Orange/Meadow Hawkweed	Low		2	0.25	Mechanical Control	Recreation Area	1
			T62N R2W SEC 31	Common Tansy	Low						
2	Trail 279	Beehive Lakes Trail	T61N R2W SEC 7, 8	Common Tansy	Low		2	0.25	Mechanical Control	Recreation Area	1
3	Road 231	Pack River Road	T61N R2W SEC 5,8,17,20	Common Tansy	Heavy	3	6	2	Mechanical Control	Recreation Access	2
				Spotted Knapweed	Heavy						
				Goatweed	Moderate						
				Ox-Eye Daisy	Moderate						
				Hawkweeds	Moderate						
4	Road 280	Grouse Creek Road	T59N R1E SEC 13,16,20,21,22,23	Spotted Knapweed	Heavy	6.5	10	10	Mechanical Control	Riparian	3
			T59N R2E SEC 7,8,18	Common Tansy	Heavy						
5		Grouse Creek	T59N RR1E, SEC 13,16,20,21,22,23	Common Tansy	Heavy		100	100	Cultural Control	Riparian	3
			T59N R2E SEC 7,8,18						(Plant Riparian Area)		
6	Road 275	Trestle Creek Road	T57N R1E SEC 11,12	Common Tansy	Low-Mod	9	5.5	1	Mechanical Control	Recreation Access	2
			T57N R2E SEC 5,6,7	Spotted Knapweed	Low-Heavy						
			T58N R2E SEC 20,21,29,31,32	Ox-Eye Daisy	Low						
				Hawkweeds	Low-Mod						
7	Road 1091	Lunch Peak Road	T58N R2E SEC 15,16,17,20,21	Common Tansy	Low	4	2	0.25	Mechanical Control	Recreation Access	1
				Ox-Eye Daisy	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
8	Road 275	Quartz Creek Road	T58N R2E SEC 21,22,23,28	Ox-Eye Daisy	Moderate	4	2	0.25	Mechanical Control	Recreation Access	2
				Hawkweeds	Moderate						
				Spotted Knapweed	Moderate						
				Goatweed	Moderate						
9	Trail 120	Quartz Creek Trailhead	T58N R2E SEC 29	Common Tansy	Moderate		1	0.25	Mechanical (Burning)	Recreation Access - Trailhead	1
				Ox-Eye Daisy	Moderate						
10	Road 419	Upper Lightning Creek	T58N R2E SEC 14	Goatweed	Low-Heavy	1.5	1	0.25	Mechanical Control	Inventoried Roadless Adjacent	2
				Meadow Hawkweed	Low						
11	Trail 52	Lake Darling Trailhead	T58N R2E SEC 1	Ox-Eye Daisy	Low		0.1	0.1	Mechanical Control	Recreation Area	1
				Common Tansy	Low						
				Spotted Knapweed	Low						
				Goatweed	Low						
12	Trail 554	Gem Lake Trailhead	T58N R2E SEC 13	Ox-Eye Daisy	Low		0.1	0.1	Mechanical Control	Recreation Area	1
				Goatweed	Low					Sensitive Plants	
13	Road 1022	Moose Creek Road	T58N R3E SEC 19,29	Ox-Eye Daisy	Moderate	1	2.42	0.5	Mechanical Control	Recreation Access	2
				Orange Hawkweed	Low						
				Common Tansy	Moderate						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
14	Trail 237	Moose Lake Trailhead	T58N R3E SEC 19	Ox-Eye Daisy	Moderate		0.25	0.1	Mechanical Control	Recreation Area	1
				Orange Hawkweed	Low						
				Common Tansy	Moderate						
15	Road 1082	Cochran Draw Road	T57N R2E SEC 6,7	Common Tansy	Moderate	1.1	2.66	0.67	Mechanical Control	Adjacent To Newly	2
				Goatweed	Moderate					Obliterated Road System	
				Hawkweeds	Heavy						
				Ox-Eye Daisy	Moderate						
				Spotted Knapweed	Moderate						
16		Clark Fork Range	T55N R3E SEC 20	Spotted Knapweed	Heavy		150	150	Biological Control	Wildlife Habitat	3
				Ox-Eye Daisy	Heavy					Surrounded By Private Lands	
				Sulfur Cinquefoil	Heavy						
17	Road 332	High Drive	T54N R2E SEC 4,9,10,11-14,17,18	Goatweed	Moderate	8.5	5	0.5	Mechanical Control	Recreation Access	3
			T55N R2E SEC 31,32	Spotted Knapweed	Low					Open Meadow-Native Species	
				Meadow Hawkweed	Low						
18		Summit Camp	T54N R2E SEC 5	Goatweed	Moderate		0.1	0.1	Mechanical Control	Recreation Accesss	3
				Spotted Knapweed	Low						
				Meadow Hawkweed	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
19		Buckskin Saddle	T54N R2E SEC 15	Goatweed	Moderate		0.1	0.1	Mechanical Control	Recreation Access	3
				Spotted Knapweed	Low						
				Meadow Hawkweed	Low						
20		Johnson Divide	T55N R2E SEC 31	Goatweed	Moderate		0.1	0.1	Mechanical Control	Recreation Access	3
				Spotted Knapweed	Low						
				Meadow Hawkweed	Low						
21	Trail 105	Teepee Gulch Trail	T55N R1E SEC 16,21	Spotted Knapweed	Low-Heavy		0.5	0.1	Mechanical Control	Recreation, Recent Wildfire	2
				Goatweed	Low-Heavy						
				Common Tansy	Low-Heavy						
22	Trail 69	Green Monarch Trail	T55N R1E SEC 14,15,16,17,19,20,-23	Spotted Knapweed	Low-Heavy		2	0.4	Mechanical Control	Recreation, Recent Wildfire	2
	Trail 68	Schafer Peak Trail		Common Tansy	Low-Heavy						
				Goatweed	Low-Heavy						
23	Road 1063	Schafer Peak Road	T55N R1E SEC 20,21	Spotted Knapweed	Low-Heavy	0.5	1.21	0.6	Mechanical Control	Road Is Part Of Trail 105	2
				Common Tansy	Low-Heavy						
				Goatweed	Low-Heavy						
24		Kilroy Fire - Lake Interface	T55N R1E SEC 7,8,9,10,11,12	Spotted Knapweed	Low		10	0.25	Mechanical Control	Weeds Adjacent To Large Area	1
			T55N R1W SEC 13,14,23,26	Goatweed	Low					Burned In Kilroy Fire 1991	

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
25	Rd 2640e	Kirby Mountain	T57N R1E SEC 4	Ox-Eye Daisy	Heavy	1.5	5.45	1.83	Cultural Control	Closed Road System	2
	Rd 2640f			Hawkweeds	Moderate				(Plant, Fertilize)		
	Rd 2640g			Goatweed	Moderate						
				Common Tansy	Heavy						
				Spotted Knapweed	Low						
26	Rd 2640d	Kirby's Wildlife Timber Sale	T56N R1E SEC 1	Spotted Knapweed	Heavy	2	7.84	4.51	Mechanical Control	Adjacent Dry Sites To Be Burned	1
	Road 1057	Helicopter Landings	T57N R1E SEC 16	Goatweed	Low-Heavy						
		And Access Roads	T57N R1E SEC 5	Ox-Eye Daisy	Moderate						
			T58N R1E SEC 32	Common Tansy	Moderate						
27	Road 1023	Wrenco Area	T57N R3W SEC 19,30,31	Ox-Eye Daisy	Heavy	0.5	101.82	0.6	Mechanical And	Dry Sites, Proposed Timber Sale	1
				Hawkweeds	Moderate			101.22	Biological Control	Sensitive Plants Adjacent	
				Spotted Knapweed	Heavy						
				Goatweed	Heavy						
				Common Tansy	Moderate						
				Sulfur Cinquefoil	Low						
28	Trail 82	Mineral Point Trail	T56N R1E SEC 19,23,26,30	Spotted Knapweed	Mod-Heavy		0.5	0.1	Mechanical Control	Recreation Area	1
		(Includes Trailheads)		Ox-Eye Daisy	Heavy						
				Common Tansy	Heavy						
				Goatweed	Low-Mod						
				Orange Hawkweed	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
29		Lost Lake	T56N R1W SEC 19	Goatweed	Heavy		0.25	0.15	Mechanical Control	Sensitive Plants,	1
		(Old Road Near Lake)		Hawkweeds	Heavy					Peatland Habitat Adjacent	
				Ox-Eye Daisy	Heavy						
				Common Tansy	Heavy						
				Spotted Knap-weed	Heavy						
30		Green Bay Camp-ground	T56N R1W SEC 26	Spotted Knap-weed	Low		0.05	0.05	Mechanical Control	Recreation Area, Aquatic Resource	1
31	Road 1051	Big Grouse Timber Sale	T56N R1W SEC 20,29,30,31,32	Common Tansy	Low-Mod	8.5	7	0.5	Mechanical Control	Dry Sites, Recent Timber Harvest	2
				Ox-Eye Daisy	Low-Mod						
				Canada Thistle	Low						
				Goatweed	Low-Heavy						
				Meadow Hawkweed							
32	Road 2642	Gold Hill Timber Sale	T56N R1W SEC 30,31	Spotted Knap-weed	Low-Heavy	7.8	6.39	0.82	Mechanical Control	Dry Sites, Recent Timber Harvest	2
	Rd 2642a			Common Tansy	Low-Mod						
	Rd 2642c			Ox-Eye Daisy	Low-Mod						
	Rd 2642e			Goatweed	Low-Heavy						
				Sulfur Cinque-foil	Low-Mod						
33	Trail 11	Gold Hill Trail	T56N R1W SEC 30,31	Goatweed	Low		0.5	0.1	Mechanical Control	Recreation Area	1
				Sulfur Cinque-foil	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
34	Road 2697	Long Mountain Road System	T55N R4W SEC24	Spotted Knapweed	Heavy	5.3	56.21	2.57	Mechanical And	Weed Corridor	3
	Road 2553		T55N R3W SEC 17,20,21,27,28,29,-32	Goatweed	Heavy			52.3	Biological Control		Hounds-
	Spur 2553		T55N R3W SEC 29,32	Meadow Hawkweed	Mod-Heavy						tongue Is
				Orange Hawkweed	Low						Priority 1
				Common Tansy	Moderate						
				Ox-Eye Daisy	Low						
				Sulfur Cinquefoil	Low						
				Dalmatian Toadflax	Low						
				Houndstongue	Low						
35	Trail 113	Kickbush Trail	T53N R1W SEC 11	Spotted Knapweed	Low		0.5	0.03	Mechanical Control	Recreation Area	1
				Goatweed	Low						
				Goatweed	Low						
36	Trail 677	Dixie Queen Trail	T53N R1W SEC 1	Spotted Knapweed	Heavy		27.42	2.42	Mechanical And	Recreation Area	1
				Goatweed	Heavy			22.83	Biological Control		
				Common Tansy	Heavy						
				Ox-Eye Daisy	Heavy						
				Meadow Hawkweed	Moderate						
				Sulfur Cinquefoil	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
37	Trail 111	Branch North Gold Trail	T53N R1W SEC 1	Spotted Knapweed	Heavy		12.42	1.21	Mechanical And	Recreation Area	1
				Goatweed	Heavy			9.04	Biological Control		
				Common Tansy	Heavy						
				Ox-Eye Daisy	Heavy						
				Meadow Hawkweed	Moderate						
				Sulfur Cinquefoil	Low						
38	Road 278	Lakeview Road	T53N R1W, T54N R1W	Spotted Knapweed	Heavy	42.9	57.43	57.43	Biological Control	Major Weed Corridor	2
			T55N R1W, R1E, R2E	Goatweed	Heavy						Rush Skeletonweed
				Ox-Eye Daisy	Moderate						is
				Common Tansy	Moderate						Priority 1
				Canada Thistle	Low						
				Sulfur Cinquefoil	Low						
				Meadow Hawkweed	Low-Mod						
				Rush Skeletonweed	Low						
				Musk Thistle	Low						
39		Powerline Right Of Way	T53N R1W, T54N R1W, 1E	Spotted Knapweed	Heavy		267.5	26.75	Mechanical And	Major Source Of Weed Seed	3
			T55N R1E, 2E	Goatweed	Heavy			240.75	Biological Control		Rush Skele-
				Ox-Eye Daisy	Heavy						tonweed is
				Common Tansy	Moderate						Priority 1
				Canada Thistle	Moderate						
				Sulfur Cinquefoil	Low						
				Meadow Hawkweed	Low-Mod						
				Rush Skeletonweed	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
39 (cont.)				Dalmatian Toadflax	Low						
				Canada Thistle	Low-Mod						
40	Road 2760	Whiskey Rock Campground	T54N R1W SEC 3	Spotted Knapweed	Moderate	0.5	0.5	0.04	Mechanical Control	Recreation Area	1
				Goatweed	Moderate						
				Sulfur Cinquefoil	Low						
41	Road 278l	Barton Hump Road System	T54N R1W SEC 10,11,14,15	Canada Thistle	Moderate	4.1	3.85	0.96	Mechanical Control	Dry Sites, Wildlife Habitat	2
	Road 278z			Spotted Knapweed	Low-Heavy						
	Road 278k			Goatweed	Low-Mod						
				Ox-Eye Daisy	Heavy						
42		Barton Hump Area	T54N R1W SEC 10,11,14,15	Spotted Knapweed	Heavy		300	300	Biological Control	Dry Sites, Wildlife Habitat	3
				Ox-Eye Daisy	Heavy					Inventoried Roadless Area Nearby	
				Goatweed	Moderate						
43	Road 2707	Powerline Road	T53N R2W SEC 13,23,24	Meadow Hawkweed	Low-Mod	7.1	36.36	8.6	Mechanical And	Major Weed Corridor	2
			T53N R1W SEC 9,10,16,17	Spotted Knapweed	Heavy			19.23	Biological Control	Timber Harvest And Underburning	
				Goatweed	Heavy						
				Common Tansy	Heavy						
				Dalmatian Toadflax	Low						
44	Road 1050	Green Mountain Road	T54N R1W SEC 2,11,14,23,24,25	Spotted Knapweed	Heavy	8	70	4.85	Mechanical And	Dry Sites, Wildlife Habitat	2
				Goatweed	Heavy			47.15	Biological Control		
				Common Tansy	Low-Mod						
				Hawkweeds	Low-Mod						
				Ox-Eye Daisy	Moderate						
				Dalmatian Toadflax	Low						
				Sulfur Cinquefoil	Low						

Table II-1. Alternative B (continued)

SITE NO.	ROAD NO.	LOCATION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTA-TION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
45	Trail 76	Packsaddle Trail	T54N R1W SEC 13,14	Spotted Knap-weed	Low-Heavy		0.6	0.1	Mechanical Control	Through Invento-ried Roadless	1
			T54N R1E SEC 17,18	Goatweed	Low-Heavy						
46	Road 1083	Falls Creek Road System	T54N R1W SEC 2	Meadow Hawk-weed	Moderate	3.6	2.23	0.61	Mechanical Control	Closed Road System To Be	1
	Rd 1083a		T55N R1W SEC 35	Spotted Knap-weed	Moderate					Opened For Up-per Cedar Creek	
	Rd 1083b			Goatweed	Heavy					Timber Sale	
	Rd 1083c			Orange Hawk-weed	Low						

Alternative B

Total Road Miles	Total Infestation Acres	Total Control Acres
		507.43 Biological Only
		101.83 Cultural Only
		26.09 Mechanical Only
		0 Biological And Cultural
		539.52 Mechanical And Biological (47 Ac Mech +492.52 Ac Biological)
		0 Mechanical And Cultural
130.9	**1270.86**	**1174.87**

Table II-2. Alternative C: Mechanical, Cultural, Biological, and Chemical Treatment

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTA-TION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
1	Trail 217	Harrison Lake Trail	T61N R2W SEC 5	Hawkweeds	Low		2	0.25	Clopyralid, 2,4-D Amine	Recreation Area	1
			T62N R2W SEC 31	Common Tansy	Low						
2	Trail 279	Beehive Lakes Trail	T61N R2W SEC 7, 8	Common Tansy	Low		2	0.25	Clopyralid, 2,4-D Amine	Recreation Area	1
3	Road 231	Pack River Road	T61N R2W SEC 5,8,17,20	Common Tansy	Heavy	3	6	2	Clopyralid, 2,4-D Amine	Recreation Ac-cess	2
				Spotted Knap-weed	Heavy						
				Goatweed	Moderate						
				Ox-Eye Daisy	Moderate						
				Hawkweeds	Moderate						
4	Road 280	Grouse Creek Road	T59N R1E SEC 13,16,20,21,22,23	Spotted Knap-weed	Heavy	6.5	10	10	Mechanical Control	Riparian	3
			T59N R2E SEC 7,8,18	Common Tansy	Heavy						
5		Grouse Creek	T59N R1E, SEC 13,16,20,21,22,23	Common Tansy	Heavy		100	100	Cultural	Riparian	3
			T59N R2E SEC 7,8,18						(Plant Riparian Area)		
6	Road 275	Trestle Creek Road	T57N R1E SEC 11,12	Common Tansy	Low-Mod	9	5.5	1	Picloram,	Recreation Ac-cess	2
			T57N R2E SEC 5,6,7	Spotted Knap-weed	Low-Heavy				Metsulfuron Methyl		
			T58N R2E SEC 20,21,29,31,32	Ox-Eye Daisy	Low						
				Hawkweeds	Low-Mod						
7	Road 1091	Lunch Peak Road	T58N R2E SEC 15,16,17,20,21	Common Tansy	Low	4	2	0.25	Dicamba, 2,4-D Amine	Recreation Ac-cess	1
				Ox-Eye Daisy	Low						

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
8	Road 275	Quartz Creek Road	T58N R2E SEC 21,22,23,28	Ox-Eye Daisy	Moderate	4	2	0.25	Clopyralid, 2,4-D Amine	Recreation Access	2
				Hawkweeds	Moderate						
				Spotted Knapweed	Moderate						
				Goatweed	Moderate						
9	Trail 120	Quartz Creek Trailhead	T58N R2E SEC 29	Common Tansy	Moderate		1	0.2	Metsulfuron Methyl	Recreation Access - Trailhead	1
				Ox-Eye Daisy	Moderate			0.05	Mechanical (Burning)		
10	Road 419	Upper Lightning Creek	T58N R2E SEC 14	Goatweed	Low-Heavy	1.5	1	0.25	Clopyralid, 2,4-D Amine	Inventoried Roadless Adjacent	2
				Meadow Hawkweed	Low						
11	Trail 52	Lake Darling Trailhead	T58N R2E SEC 1	Ox-Eye Daisy	Low		0.1	0.1	Metsulfuron Methyl	Recreation Area	1
				Common Tansy	Low				Clopyralid, 2,4-D Amine		
				Spotted Knapweed	Low						
				Goatweed	Low						
12	Trail 554	Gem Lake Trailhead	T58N R2E SEC 13	Ox-Eye Daisy	Low		0.1	0.1	Clopyralid, 2,4-D Amine	Recreation Area	1
				Goatweed	Low					Sensitive Plants	
13	Road 1022	Moose Creek Road	T58N R3E SEC 19,29	Ox-Eye Daisy	Moderate	1	2.42	0.5	Metsulfuron Methyl	Recreation Access	2
				Orange Hawkweed	Low				Clopyralid, 2,4-D Amine		
				Common Tansy	Moderate						
14	Trail 237	Moose Lake Trailhead	T58N R3E SEC 19	Ox-Eye Daisy	Moderate		0.25	0.1	Metsulfuron Methyl,	Recreation Area	1
				Orange Hawkweed	Low				Clopyralid, 2,4-D Amine		
				Common Tansy	Moderate						

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
15	Road 1082	Cochran Draw Road	T57N R2E SEC 6,7	Common Tansy	Moderate	1.1	2.66	0.67	Metsulfuron Methyl	Adjacent To Newly	2
				Goatweed	Moderate				Picloram, 2,4-D Amine	Obliterated Road System	
				Hawkweeds	Heavy						
				Ox-Eye Daisy	Moderate						
				Spotted Knapweed	Moderate						
16		Clark Fork Range	T55N R3E SEC 20	Spotted Knapweed	Heavy		150	150	Biological Control	Wildlife Habitat	3
				Ox-Eye Daisy	Heavy					Surrounded By Private Lands	
				Sulfur Cinquefoil	Heavy						
17	Road 332	High Drive	T54N R2E SEC 4,9,10,11-14,17,18	Goatweed	Moderate	8.5	5	0.5	Clopyralid, 2,4-D Amine	Recreation Access	3
			T55N R2E SEC 31,32	Spotted Knapweed	Low					Open Meadow-Native Species	
				Meadow Hawkweed	Low						
18		Summit Camp	T54N R2E SEC 5	Goatweed	Moderate		0.1	0.1	Clopyralid, 2,4-D Amine	Recreation Accesss	3
				Spotted Knapweed	Low						
				Meadow Hawkweed	Low						
19		Buckskin Saddle	T54N R2E SEC 15	Goatweed	Moderate		0.1	0.1	Clopyralid, 2,4-D Amine	Recreation Access	3
				Spotted Knapweed	Low						
				Meadow Hawkweed	Low						

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
20		Johnson Divide	T55N R2E SEC 31	Goatweed	Moderate		0.1	0.1	Clopyralid, 2,4-D Amine	Recreation Access	3
				Spotted Knapweed	Low						
				Meadow Hawkweed	Low						
21	Trail 105	Teepee Gulch Trail	T55N R1E SEC 16,21	Spotted Knapweed	Low-Heavy		0.5	0.1	Clopyralid,	Recreation, Recent Wildfire	2
				Goatweed	Low-Heavy				Metsulfuron Methyl		
				Common Tansy	Low-Heavy						
22	Trail 69	Green Monarch Trail	T55N R1E SEC 14-17,19,20,23	Spotted Knapweed	Low-Heavy		2	0.4	Clopyralid,	Recreation, Recent Wildfire	2
	Trail 68	Schafer Peak Trail		Common Tansy	Low-Heavy				Metsulfuron Methyl		
				Goatweed	Low-Heavy						
23	Road 1063	Schafer Peak Road	T55N R1E SEC 20,21	Spotted Knapweed	Low-Heavy	0.5	1.21	0.6	Clopyralid,	Road Is Part Of Trail 105	2
				Common Tansy	Low-Heavy				Metsulfuron Methyl		
				Goatweed	Low-Heavy						
24		Kilroy Fire-Lake Interface	T55N R1E SEC 7,8,9,10,11,12	Spotted Knapweed	Low		10	0.25	H20-Formulated	Weeds Adjacent To Large Area	1
			T55N R1W SEC 13,14,23,26	Goatweed	Low				2,4-D Amine,	Burned In Kilroy Fire 1991	
									Metsulfuron Methyl		
25	Rd 2640e	Kirby Mountain	T57N R1E SEC 4	Ox-Eye Daisy	Heavy	1.5	5.45	1.83	Cultural	Closed Road System	3
	Rd 2640f			Hawkweeds	Moderate				(Plant,Fertilize To		
	Rd 2640g			Goatweed	Moderate				Shade Out Weeds On		
				Common Tansy	Heavy				Roads)		
				Spotted Knapweed	Low						

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
26	Rd 2640d	Kirby'S Wildlife Timber Sale	T56N R1E SEC 1	Spotted Knapweed	Heavy	2	7.84	4.51	Picloram,	Adjacent Dry Sites To Be Burned	1
	Road 1057	Helicopter Landings	T57N R1E SEC 16	Goatweed	Low-Heavy				Clopyralid, 2,4-D Amine		
		And Access Roads	T57N R1E SEC 5	Ox-Eye Daisy	Moderate						
			T58N R1E SEC 32	Common Tansy	Moderate						
27	Road 1023	Wrenco Area	T57N R3W SEC 19,30,31	Ox-Eye Daisy	Heavy	0.5	101.82	0.6	Picloram On Rd Row	Dry Sites, Proposed Timber Sale	1
				Hawkweeds	Moderate			101.22	Biological Off Road	Sensitive Plants Adjacent	
				Spotted Knapweed	Heavy						
				Goatweed	Heavy						
				Common Tansy	Moderate						
				Sulfur Cinquefoil	Low						
28	Trail 82	Mineral Point Trail	T56N R1E SEC 19,23,26,30	Spotted Knapweed	Mod-Heavy		0.5	0.1	Metsulfuron Methyl,	Recreation Area	1
		(Includes Trailheads)		Ox-Eye Daisy	Heavy				Clopyralid, 2,4-D Amine		
				Common Tansy	Heavy						
				Goatweed	Low-Mod						
				Orange Hawkweed	Low						
29		Lost Lake	T56N R1W SEC 19	Goatweed	Heavy		0.25	0.05	Metsulfuron Methyl,	Sensitive Plants,	1
		(Old Road Near Lake)		Hawkweeds	Heavy				Clopyralid, 2,4-D Amine	Peatland Habitat Adjacent	
				Ox-Eye Daisy	Heavy			0.1	Mechanical		
				Common Tansy	Heavy						
				Spotted Knapweed	Heavy						
30		Green Bay Campground	T56N R1W SEC 26	Spotted Knapweed	Low		0.05	0.05	Mechanical	Recreation, Aquatic Resource	1

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
31	Road 1051	Big Grouse Timber Sale	T56N R1W SEC 20,29,30,31,32	Common Tansy	Low-Mod	8.5	7	0.5	Picloram, 2,4-D Amine,	Dry Sites, Recent Timber Harvest	2
				Ox-Eye Daisy	Low-Mod				Metsulfuron Methyl		
				Canada Thistle	Low						
				Goatweed	Low-Heavy						
				Meadow Hawkweed	Low						
32	Road 2642	Gold Hill Timber Sale	T56N R1W SEC 30,31	Spotted Knapweed	Low-Heavy	7.8	6.39	0.82	Clopyralid, 2,4-D Amine	Dry Sites, Recent Timber Harvest	2
	Rd 2642a			Common Tansy	Low-Mod						
	Rd 2642c			Ox-Eye Daisy	Low-Mod						
	Rd 2642e			Goatweed	Low-Heavy						
				Sulfur Cinquefoil	Low-Mod						
33	Trail 11	Gold Hill Trail	T56N R1W SEC 30,31	Goatweed	Low		0.5	0.1	Clopyralid, 2,4-D Amine	Recreation Area	1
				Sulfur Cinquefoil	Low						
34	Road 2697	Long Mountain Road System	T55N R4W SEC 24	Spotted Knapweed	Heavy	5.3	56.21	2.57	Picloram, 2,4-D Amine,	Weed Corridor	3
	Road 2553		T55N R3W SEC17,20,21,27-29,32	Goatweed	Heavy				Metsulfuron Methyl		Hounds-
	Spur 2553			Meadow Hawkweed	Mod-Heavy			52.3	Biological Control		tongue is
				Orange Hawkweed	Low						Priority 1
				Common Tansy	Moderate						
				Ox-Eye Daisy	Low						
				Sulfur Cinquefoil	Low						
				Dalmatian Toadflax	Low						
				Houndstongue	Low						
35	Trail 113	Kickbush Trail	T53N R1W SEC 11	Spotted Knapweed	Low		0.5	0.03	Clopyralid, 2,4-D Amine	Recreation Area	1
				Goatweed	Low						

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
36	Trail 677	Dixie Queen Trail	T53N R1W SEC 1	Spotted Knapweed	Heavy		27.42	2.42	Clopyralid, 2,4-D Amine	Recreation Area	1
				Goatweed	Heavy			22.83	Biological Control		
				Common Tansy	Heavy						
				Ox-Eye Daisy	Heavy						
				Meadow Hawkweed	Moderate						
				Sulfur Cinquefoil	Low						
37	Trail 111	Branch North Gold Trail	T53N R1W SEC 1	Spotted Knapweed	Heavy		12.42	1.21	Clopyralid, 2,4-D Amine	Recreation Area	1
				Goatweed	Heavy			9.04	Biological Control		
				Common Tansy	Heavy						
				Ox-Eye Daisy	Heavy						
				Meadow Hawkweed	Moderate						
				Sulfur Cinquefoil	Low						
38	Road 278	Lakeview Road	T53N R1W, T54N R1W	Spotted Knapweed	Heavy	42.9	57.43	57.43	Picloram,	Major Weed Corridor	2
			T55N R1W, R1E, R2E	Goatweed	Heavy				Metsulfuron Methyl		RUSH SKELE-
				Ox-Eye Daisy	Moderate						TON WEED IS
				Common Tansy	Moderate						PRIORITY 1
				Canada Thistle	Low						
				Sulfur Cinquefoil	Low						
				Meadow Hawkweed	Low-Mod						
				Rush Skeletonweed	Low						
				Musk Thistle	Low						
39		Powerline Right Of Way	T53N R1W, T54N R1W, 1E	Spotted Knapweed	Heavy		267.5	26.75	Picloram,	Major Source Of Weed Seed	3
			T55N R1E, 2E	Goatweed	Heavy				Metsulfuron Methyl		Rush Skele-
				Ox-Eye Daisy	Heavy			240.75	Biological Control		ton Weed Is
				Common Tansy	Moderate						Priority 1

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
39				Canada Thistle	Moderate						
cont.				Sulfur Cinquefoil	Low						
				Meadow Hawkweed	Low-Mod						
				Rush Skeletonweed	Low						
				Dalmatian Toadflax	Low						
				Canada Thistle	Low-Mod						
40	Road 2760	Whiskey Rock Campground	T54N R1W SEC 3	Spotted Knapweed	Moderate	0.5	0.5	0.04	H20-Formulated 2,4-D Amine	Recreation Area	1
				Goatweed	Moderate						
				Sulfur Cinquefoil	Low						
41	Road 278l	Barton Hump Road System	T54N R1W SEC 10,11,14,15	Canada Thistle	Moderate	4.1	3.85	0.96	Picloram, Metsulfuron Methyl	Dry Sites, Wildlife Habitat	2
	Road 278z			Spotted Knapweed	Low-Heavy						
	Road 278k			Goatweed	Low-Mod						
				Ox-Eye Daisy	Heavy						
42		Barton Hump Area	T54N R1W SEC 10,11,14,15	Spotted Knapweed	Heavy		300	300	Biological Control	Dry Sites, Wildlife Habitat	3
				Ox-Eye Daisy	Heavy					Inventoried Roadless Area Nearby	
				Goatweed	Moderate						
43	Road 2707	Powerline Road	T53N R2W SEC 13,23,24	Meadow Hawkweed	Low-Mod	7.1	36.36	8.6	Picloram,	Major Weed Corridor	2
			T53N R1W SEC 9,10,16,17	Spotted Knapweed	Heavy				Metsulfuron Methyl	Timber Harvest And Underburning	
				Goatweed	Heavy			19.23	Biological Control		
				Common Tansy	Heavy						
				Dalmatian Toadflax	Low						

Table II-2. Alternative C (continued)

SITE NO.	ROAD NO.	LOCATION DESCRIPTION	LEGAL LOCATION	WEED SPECIES	RATING	ROAD MI.	INFESTATION AC.	CONTROL AC.	PROPOSED TREATMENT	RESOURCE CONCERNS	PRIORITY
44	Road 1050	Green Mountain Road	T54N R1W SEC 2,11,14,23,24,25	Spotted Knapweed	Heavy	8	70	4.85	Picloram, 2,4-D Amine,	Dry Sites, Wildlife Habitat	2
				Goatweed	Heavy				Metsulfuron Methyl		
				Common Tansy	Low-Mod			47.15	Biological Control		
				Hawkweeds	Low-Mod						
				Ox-Eye Daisy	Moderate						
				Dalmatian Toadflax	Low						
				Sulfur Cinquefoil	Low						
45	Traill 76	Packsaddle Trail	T54N R1W SEC 13,14	Spotted Knapweed	Low-Heavy		0.6	0.1	Dicamba	Through Inventoried Roadless	1
			T54N R1E SEC 17,18	Goatweed	Low-Heavy				(Dry Granules)		
46	Road 1083	Falls Creek Road System	T54N R1W SEC 2	Meadow Hawkweed	Moderate	3.6	2.23	0.61	Picloram, 2,4-D Amine,	Closed Road System To Be	1
	Rd 1083a		T55N R1W SEC 35	Spotted Knapweed	Moderate				Metsulfuron Methyl	Opened For Upper Cedar Creek	
	Rd 1083b			Goatweed	Heavy					Timber Sale	
	Rd 1083c			Orange Hawkweed	Low						

ROAD MI.	INFESTATION AC.	CONTROL AC.	
		73.07	Herbicide Only
		539.52	Herbicide & Biological (47 Ac Herbicide + 492.52 Ac Bio)
		0.40	Herbicide & Mechanical (0.25 Ac Herbicide + 0.15 Ac Mech)
		450.00	Biological Only
		101.83	Cultural Only
		10.05	Mechanical Only
130.9	1270.86	1174.87	Total Control Acres

Table II-3. Comparison of the Alternatives Considered in Detail

This table compares the alternatives by issue. More information on the issues is available on pages II-1 through II-3.

Issue and Effects Measurement Factor	Alternative A	Alternative B	Alternative C
Effects of Noxious Weed Spread on the Physical, Biological and Ecological Environment			
Effects on Vegetation			
Number of Acres Treated	Unknown	1174.87	1174.87
Effects on Native Plant Communities (including Sensitive Plants)	Long-term decline	Long-term decline at slower rate than Alt. A	Reduced effect of weeds on native plant communities
Effects on Aquatic Resources			
Changes in water quality	None detectable	None detectable	None detectable
Changes in volume of runoff	Slight increase	Same as Alt. A	slight decrease
Changes in sediment yield	Slight increase	Same as Alt. A	slight decrease
Are changes within acceptable limits for fisheries?	yes	yes	yes
Effects on Wildlife and Wildlife Habitat	Long-term decline in forage habitat	Long-term decline in forage habitat at slower rate than Alt. A	Long-term benefit to forage habitat
Economics, Effectiveness and Potential Impacts of Various Weed Control Methods on Natural Resources			
Cost of Implementation	$1,500-$6,500 per year	$413,397 over three years	$226,841 over three years
Predicted Effectiveness	0%	38%	70%
Effects on Vegetation			
Impacts on Desired Species	Long-term decline	Long-term decline at slower rate than Alt. A	Potential short-term impacts to individuals, long-term benefits
Impacts on Weed Infestations	Long-term increase in infestations and rate of spread	Long-term increase at slower rate than Alt. A	Long-term decrease in infestations and rate of spread

Issue and Effects Measurement Factor	Alternative A	Alternative B	Alternative C
<u>Effects on Aquatic Resources</u>			
Changes in water quality	None detectable	None detectable	None detectable
Changes in volume of runoff	No change	Slight increase	Same as Alt. B
Changes in sediment yield	No change	Slight increase	Same as Alt. B
Are changes within acceptable limits for fisheries?	yes	yes	yes
<u>Effects on Wildlife and Wildlife Habitat</u>			
Wildlife	No change	Minimal disturbance during treatment	Minimal disturbance during treatment
Wildlife Habitat	Long-term decline in forage habitat	Long-term decline in forage habitat at slower rate than Alt. A	Long-term benefit to forage habitat
Potential Effects on Human Health from the Application of Herbicides			
Effects on weed control workers	No change	Slight risk of skin and eye irritations, cuts, sprains and bruises	Same as Alt. B (risk from herbicides would be insignificant)
Effects on visitors or nearby residents	No change	No effect	Same as Alt. B (risk from herbicides would be insignificant)

Chapter III
The Affected Environment

Introduction

This chapter describes the current conditions of the physical, biological and human resources which could be affected by the proposed action.

The resources are described as they relate to proposed noxious weed control methods. The discussion begins with a description of the physical environment of the Pend Oreille Sub-Basin Ecosystem. It is followed by existing noxious weed conditions in the Sandpoint Ranger District. Past treatment efforts and the results of those activities are discussed. County and State weed control efforts are also described.

Other resource discussions cover Vegetative Community Diversity, Sensitive Plants, Soils and Aquatic Resources, Wildlife, Human Resources and Human Health.

Pend Oreille Sub-Basin Ecosystem

The project area is located within the Pend Oreille Sub-Basin Ecosystem of the Upper Columbia River Basin. Topography across the district encompasses all aspects. Elevations range from approximately 2,000 feet at Lake Pend Oreille to about 7,000 feet within the Cabinet Mountain Range. The Purcell Trench and Lake Pend Oreille bisect the ecosystem into eastern and western halves.

Except for the tallest peaks, the region was covered by ice during previous episodes of glaciation. The latest glacial period ended 10,000 to 12,000 years ago. Alpine glaciers formed many cirques and basins at higher elevations. These now often contain small lakes and wet meadows.

The Selkirk Mountains area is underlain with intrusive rocks associated with the Kaniksu Batholith. The bedrock is composed of coarse-grained, light-colored granite and granodiorite.

The Cabinet Mountains contain a mixture of granitics and Belt Series rock. Belt Series rocks are metasedimentary rocks which have been modified by heat and pressure. These rocks are characterized by layers which may be tilted by uplifting and folding in the earth's crust. This area was covered with ice during the last glaciation and was subject to more recent alpine glaciation. Localized lakebed deposits of fine sands and silts may be found in this area. Most of the soils in this area developed from Belt Series rock are coarse textured with many rock fragments.

The area to the east of Pend Oreille Lake is underlain by Belt Series rocks with local glacial deposits. Volcanic activity has deposited ash on the area several times since the last glaciation. On undisturbed sites, the ash layer is from 15 to 30 cm (6 to 12 inches) thick and up to 1 m (39 inches) thick. Due to wind and water action, deposition of volcanic material has been concentrated on north and northeast facing slopes. This distribution accentuates the differences in plant communities between north and south aspects.

Climate of the analysis area is dominated by a Pacific maritime influence. Winters are relatively mild, while summers are dry with occasional wet thunderstorms. Most of the area's precipitation falls as snow between October and March.

State and County Weed Control Activities

The State of Idaho and Bonner, Boundary and Kootenai Counties have noxious weed control

programs. The State of Idaho is responsible for directing noxious weed activities. Each county has a noxious weed control board which is responsible for controlling weeds along county roads, providing information to residents and other agencies about weed control methods, and for providing technical assistance for weed management on private lands.

County weed control agencies actively treat weed infestations along roads within their jurisdiction. In addition, the boards assist with the Certified Weed Free Hay Program, enforcement of the noxious weed control law, and identification of new weed invaders.

Existing Weed Infestations

In 1996, noxious weed surveys were conducted at 46 sites, and infestations were rated as low (1-400 plants per tenth mile), moderate (400-1,000 plants per tenth mile) or heavy (1,000+ plants per tenth mile). Based on the level of infestation and the weed species present, as well as the resource values at risk, various treatment methods were recommended. The sites were then prioritized for treatment. Table II-2 displays infestation ratings and priorities for each of the proposed sites. Results of the surveys can be found in the project file.

Over 1,200 acres of infestation were documented. The most prevalent species are spotted knapweed, common tansy, goatweed, meadow hawkweed, orange hawkweed, dalmatian toadflax, ox-eye daisy and sulfur cinquefoil. Smaller populations of rush skeletonweed, Canada thistle and hound's-tongue have been detected.

Additional infestations of the above species are known or suspected to occur throughout the district, but have not been quantified. Other weed species, such as bull thistle, leafy spurge, musk thistle, purple loosestrife, tansy ragwort and diffuse knapweed are known or suspected to occur on National Forest lands within the District but have not been quantified. Yellow starthistle is not yet known to occur in the district, but has been reported in Bonner County (Callihan et al. 1989) and in Boundary County (Callihan and Miller 1997).

Future surveys will reveal additional weed populations. Treatment methods for those sites will be determined by evaluating site and weed species characteristics and applying the criteria established in the adaptive strategy, which is described in Chapter II and illustrated in Appendix G. Future surveys will also help us find new invaders which, if treated before they become established, can be eradicated at relatively low cost.

Dynamics of Weed Invasions

According to Cousens and Mortimer in *Dynamics of Weed Populations* (1995), weeds generally invade a region (such as the Upper Columbia River Basin) through a three-phase process:

<u>Introduction</u> - As a result of dispersal, seeds or plant fragments arrive at a site beyond their previous geographic range and establish populations of adult plants. Potential new invaders such as yellow starthistle could become a serious problem if allowed to advance beyond the introduction phase.
<u>Colonization</u> - The plants in the founding population reproduce and increase in number to form a self-perpetuating colony. Houndstongue is an example of a weed species in the colonization phase within the Pend Oreille ecosystem.
<u>Naturalization</u> - The species establishes new self-perpetuating populations, undergoes widespread dispersal and becomes incorporated within the native flora. For example, spotted knapweed, common tansy and goatweed have been naturalized within the Upper Columbia River Basin and in many areas of the Pend Oreille Sub-Basin ecosystem.

Invasion and range expansion by a weed involves all three phases. Typically, plant invasions do not occur along a single front. Instead, new outbreaks initiated by long distance dispersal become the centers for shorter distance dispersal that eventually fills the gaps between them.

The rate at which weed populations expand can be very difficult to determine, and may be exponential, (i.e. a constant proportional rate of

increase) or two-phased (with sudden range expansion following a period of little increase in abundance).

It is typically only when the naturalization phase is reached that a species is likely to be considered a nuisance and classed as a weed. Weed control efforts are then focused on limiting further spread of naturalized weeds into previously uninfested areas. Eradication is usually the goal for species considered to be new invaders at a more local level.

Thus, while a weed species may be considered naturalized within the Upper Columbia River Basin, that same species may still be in the colonization or introduction phase in the Pend Oreille Sub-Basin Ecosystem.

Methods of Weed Spread

Forest roads and trails serve as corridors for the dispersal of many weed species. Roche and Roche (1991) discuss the historical perspective of meadow knapweed invasion in the Pacific Northwest and cite many older studies documenting the influence of road systems. Weed seeds and plant parts are moved along road systems by vehicles and people, allowing the establishment of weeds into previously uninfested areas. Many of the road systems within the project area contain infestations of such species as spotted knapweed, hawkweeds, and goatweed. As corridors, road systems allow weeds to invade areas where ground disturbance has taken place (i.e. old timber harvest, gravel pits, etc.).

Weeds are also transported by wildlife and domestic stock. Weed seeds consumed by animals or attached to their fur are carried off road and trail corridors into the forest. Some weed seeds are dispersed by the wind, while others are transported to new sites by streams and rivers. In this manner, weeds have been able to occupy undisturbed habitats far removed from road or trail systems.

Past Weed Control Efforts

Since the 1989 release of the IPNF Final EIS for Weed Pest Management, there has not been a strong weed management program in the Sandpoint Ranger District. Efforts were sporadic, consisting of spot herbicide application and biological control, some inventory, and some monitoring for effectiveness of treatments. Noxious weed populations and weed control activities were mapped. Most control efforts focused along roadsides in areas of smaller weed populations and on orange hawkweed, meadow hawkweed, and rush skeletonweed populations. Results of past surveys and treatments are located in the project file.

The limited nature of past efforts did not result in effective control of target weed infestations.

Vegetative Community Diversity

Vegetative communities within the Pend Oreille ecosystem vary from dry and semi-dry to moist forest habitats and wetlands. Dry communities are characterized by Douglas-fir and ponderosa pine with an understory of ninebark, snowberry and ceanothus and a variety of grasses and forbs; they are generally found on south to west aspects. Open, dry meadows of fescues and bunchgrasses occupy a few sites, while extensive ninebark shrubfields have developed in some dry forest communities with the exclusion of fire and the expansion of Douglas-fir root diseases.

Moist communities of huckleberry, pachistima and queencup under a canopy of western redcedar and western hemlock are common throughout the ecosystem at low and middle elevations. Cedar/hemlock forests with ladyfern, oakfern and devil's club occupy riparian habitats. Where timber has been removed in these habitats, they are typically characterized by young conifers, open tree canopies and high densities of shrub and forb species. Forests at higher elevations consist of subalpine fir, Engelmann spruce and scattered whitebark pine, often with understories of beargrass, menziesia and huckleberry. Wetland communities containing sedges, sphagnum mosses and shrubs are typical near lakes, ponds, marshes, rivers and streams throughout the ecosystem.

Noxious and undesirable weed species have been observed on National Forest lands in many of these plant communities. Dry communities as described above are inherently vulnerable to invasion by spotted knapweed, goatweed and common tansy (Lacey et al. 1995, Whitson et al. 1992). Certain habitat types within these communities are susceptible to invasion by yellow starthistle, rush skeletonweed, orange and meadow hawkweed and tansy ragwort following soil disturbance and reduction of normal canopy cover (Rice and Toney 1997).

The recent scientific assessment of the Interior Columbia Basin found that herbaceous and shrub wetland vegetation types in the Upper Columbia River Basin (including riparian habitats) have declined in area from historical conditions, in part due to invasion by certain noxious weed species (Quigley and Arbelbide 1997). Wetland habitat in the Pend Oreille Sub-Basin Ecosystem is vulnerable to decline from encroaching weeds.

Rangelands and dry forest types within the Pend Oreille Sub-Basin Ecosystem and surrounding region were described in the above assessment as having low ecological integrity, again in part due to noxious weed invasions (Quigley, Haynes et al. 1996).

Table III-1, adapted from the recent scientific assessment of the Interior Columbia Basin, displays susceptibility of the Pend Oreille Ecosystem's major vegetative community types to invasion by several weed species of concern. Susceptibility to invasion depends upon the weed's aggressiveness and the suitability of the community type as habitat for that weed. Of the prevalent cover types within the district, grasslands (including fescue-bunchgrass, herbaceous wetlands and wheatgrass bunchgrass types) and drier, open-canopied forests (such as interior Douglas-fir habitats) are the most susceptible native habitats to weed invasion. Moist and shady forested types (such as those in western redcedar and western hemlock habitats) and higher elevation types are less susceptible to weed invasion.

Threatened, Endangered and Sensitive Plants

Plant lists from the US Fish and Wildlife Service (USDI 1997) do not indicate any plant species listed as endangered in the Sandpoint Ranger District. One species listed as threatened, water howellia (*Howellia aquatilis*), is suspected to occur in the Pend Oreille ecosystem. This species requires an aquatic habitat which dries up for a portion of the year to allow for seed germination. Such habitat is found in low-elevation seasonal ponds, glacial potholes and old river oxbows.

A threatened species, as determined by the US Fish and Wildlife Service, is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Sensitive species are determined by the Northern Regional Forester as those species for which population viability is a concern, as indicated by a current or predicted downward trend in population numbers or in habitat capability which would reduce the species' existing distribution.

Riparian, aquatic, wet meadow and peatland habitats, subalpine moist cliff crevices, low to middle elevation moist rock outcrops and moist, mature coniferous forests present the greatest potential to support sensitive plant species within the ecosystem.

A complete list of sensitive plants known or suspected to occur in the Pend Oreille Sub- Basin ecosystem is included in Appendix K.

Methodology

Assessment of sensitive plant and suitable habitat occurrence was accomplished through review of Idaho Conservation Data Center (CDC) Element Occurrence Records, timber stand examination records, aerial photographs and topographical maps of the district, National Wetlands Inventory Maps, and results of previous sensitive plant surveys. Cursory surveys for sensitive plants were conducted during the 1996 noxious weed surveys.

Table III-1. Broad scale cover types in the project area and their susceptibility to invasion by 14 weed species. (Adapted from *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins*, Volume II, Table 3.174, June 1997).

Vegetative Cover Type	Musk Thistle	Diffuse Knapweed	Spotted Knapweed	Yellow Starthistle	Rush Skeleton-weed	Ox-Eye Daisy	Canada Thistle	Bull Thistle	Leafy Spurge	Orange Hawkweed	Meadow Hawkweed	Dalmatian Toadflax	Purple Loose-strife	Sulfur Cinquefoil
Cottonwood/-Willow	M	M	H	M	M	H	H	M	H	M	H	M	M	M
Engelmann Spruce/ Subalpine Fir	H	M	M	M	M	H	H	H	M	M	M	M	M	M
Fescue-Bunchgrass	H	H	H	H	M	M	H	H	H	L	L	H	L	H
Grand Fir	M	M	M	M	M	M	M	M	M	M	U	M	M	M
Herbaceous Wetlands	M		H	H	L	H	H	M	M	H	M	M	H	H
Interior Douglas-fir	H	M	H	M	M	M	H	H	M	M	M	M	L	H
Interior Pon-derosa Pine	M	H	H	M	M	M	M	M	M	L	L	M	L	H
Lodgepole Pine	M	M	M	M	M	M	M	M	M	M	L	M	L	M
Mixed-Conifer Woodlands	M	M	H	M	M	U	H	M	M	L	L	M	L	H
Native Forb	M	M	M	M	M	M	M	M	M	L	L	M	M	H
Shrub Or Herb /Tree Regeneration	M	M	M	M	H	M	M	M	M	M	L	M	L	H
Shrub Wetlands	H	M	H	M	L	M	H	H	M	M	M	M	H	M
Western Larch	M	M	M	M	M	M	H	M	M	M	M	M	L	M
W. Redcedar/ W. Hemlock	H	M	M	M	M	H	H	H	M	M	M	M	M	M
Wheatgrass Bunchgrass	M	H	H	H	M	M	H	M	M	L	L	H	L	H

H =High susceptibility to invasions - Weed species invades the cover type successfully and becomes dominant or codominant even in the absence of intense or frequent disturbance

M =Moderate susceptibility to invasion - Weed species is a "colonizer," and invades the cover type successfully following high intensity or frequent disturbance which impacts the soil surface or removes the normal canopy

L =Low susceptibility to invasion - Weed species does not establish because the cover typedoes not provide suitable habitat

U =Unknown susceptibility to invasion - Ecological requirements of the weed species are not known, or there was a lack of distribution records for the weed species, or the extent of the cover type in the project area might be so minor as to prevent or restrict the probability of obtaining distribution records fo the weed species within that cover type

Sensitive plant occurrences are scattered throughout the district in aquatic, riparian, mature moist forest, peatland and wet meadow habitats (CDC 1997). No sitings of water howellia have been documented to date, although suitable habitat for the species likely occurs within the ecosystem.

Sensitive plants are documented near seven of the proposed treatment sites. Peatland habitat near Lost Lake (site #29) supports bulb-bearing water hemlock (*Cicuta bulbifera*) and crested shield fern (*Dryopteris cristata*). Populations of Sitka clubmoss (*Diphasiastrum sitchense*) occur near the Gem Lake trail (site #12) and above the Moose Lake trail (site #14) . Large Canadian St. Johnswort (*Hypericum majus*) has been identified in aquatic habitat adjacent to the proposed Wrenco Timber Sale area (site #27), on privately owned land. Northwestern moonwort (*Botrychium montanum*) occurs in riparian habitat on National Forest land within the Wrenco Timber Sale area .

An extensive population of fringecup (*Tellima grandiflora*) occurs in riparian habitat in the lower reaches of Trestle Creek (site #6). Populations of triangle moonwort (*Botrychium lanceolatum*), pinnate moonwort (*B. pinnatum*) and Mingan moonwort (*B. minganense*) occur in moist forest habitat adjacent to Grouse Creek (sites #4 and #5).

The majority of the 46 proposed treatment sites are considered to have low potential to support sensitive plant species, since they are predominantly disturbed road cut and fill slopes, dry Douglas-fir and grand fir habitat types, or immature mesic cedar and western hemlock habitat types. The seven sites with adjacent sensitive plant occurrences were proposed for treatment because of the threat of noxious weeds to those occurrences.

Current and Potential Threats to Identified Sensitive Plant Species and Habitat

The populations of bulb-bearing water hemlock and crested shield fern at Lost Lake could be imperiled if meadow and orange hawkweed, which are establishing on the old road near the lake's western shore, invade the peatland habitat. Hawkweeds are difficult to eradicate from peatland habitats once they become well-established, since their extensive root systems can penetrate accumulated peat up to several feet deep. Once established, hawkweeds could spread rapidly and displace native wetland species, including bulb-bearing water hemlock and crested shield fern. No other current or potential threats to sensitive plants or peatland habitat at Lost Lake are known.

The populations of Sitka clubmoss are not currently imperiled by noxious weed species. However, Gem Lake trail receives moderate to heavy use by hikers and horseback riders, and is susceptible to both the spread of weed species established near the trailhead and the introduction of new weed species. The Sitka clubmoss near the Moose Lake trail is well above the trail prism in a rocky cliff and is not susceptible to disturbance from activities along that trail.

The population of large Canadian St. Johnswort has no known current threats. This species is closely related to goatweed (*Hypericum perforatum*), a weed species proposed for treatment in the Wrenco area and throughout the district. It is unknown if the *Chrysolina quadrigemina* beetle previously introduced into north Idaho to control goatweed is currently established in the Wrenco area. If so, there are no data to determine whether the beetle is impacting the sensitive large Canadian St. Johnswort.

During testing of the *Aplocera plagiata* moth in Canada prior to its release as a biological control agent for goatweed, it was found that while some damage to large Canadian St. Johnswort did occur, damage was not sufficient to warrant concerns for viability of that species in Canada (Bergman 1996). Large Canadian St. Johnswort is not a rare species in Canada; it is a boreal disjunct (its main range is north, in Canada) and occurs in the United States on the southern end of its range. The impacts of *Aplocera plagiata* on disjunct populations of large Canadian St. Johnswort are unknown. While there have been no releases of the moth in Sandpoint Ranger District, it is unknown if the species has established in the Wrenco area.

The populations of northwestern moonwort in the Wrenco area, and the northwestern, pinnate and Mingan moonwort near Grouse Creek are not currently threatened by noxious weeds. However, habitat within the Grouse Creek floodplain is overrun with common tansy. This area had been logged in the early 1900s. Continued disturbance from stream channel migration and fierce competition from common tansy and other vegetation has precluded reforestation of much of the floodplain by conifers. Habitat capability for sensitive plant species within the Grouse Creek area remains highly compromised, at least in part by noxious weed invasion.

Suitable sensitive plant habitat in aquatic, riparian, wet meadow and peatland habitat throughout the ecosystem is to varying degrees susceptible to invasion by noxious and undesirable weed species (see Table III-1).

Soils and Aquatic Resources

Soils

Due to the nature of interactions of soil characteristics and herbicides, soils are an important part of our analysis. Of particular importance are percent of organic matter in the soil, available water holding capacity of the soil, and soil permeability. These three characteristics, and the chemical properties of a given herbicide, determine both the availability of the herbicide for uptake by plants and its tendency to move through the soil.

When incorporated into the soil, a portion of herbicide dissolves in the soil water and a portion is taken into soil particles, primarily organic matter and fine particles. The amount of herbicide adsorbed, or attached, to soil particles depends on the characteristics of the chemical and on the amount of organic matter and fine material in the soil. Any herbicide that remains in water is available for uptake by plant roots. However, if the water moves off-site or out of the rooting zone, it takes some of the dissolved herbicide with it.

As proposed in this EIS, the majority of herbicide application would be on road prisms. Soils within road prisms are generally devoid of organic matter and have low water holding capacity and generally restricted permeability rates. Herbicides applied to roads have a high risk of being carried off-site, either dissolved in water or adsorbed onto soil particles. If these transported herbicides end up being directed off the road and onto the undisturbed forest floor, they may be retained in the surface soils. If the herbicides are directed into ditches and streams, little to no filtration will take place.

Most undisturbed soils in North Idaho have a surface layer from 2 to 5 inches thick. The lower part of this litter layer is highly decomposed and would have a high likelihood of herbicide adsorption. Below the organic litter layer, volcanic ash occurs as the surface layer of mineral soil. The ash layer varies from 7 to 16 inches thick. The top part of the ash is rich in organic matter; the entire ash layer has a very high water holding capacity and herbicide-nutrient holding capacity. The risk of herbicide movement through undisturbed forest soils into ground water is low in most places.

Two basic categories of vegetation types are associated with proposed treatment sites: riparian areas and upland areas. Only a few sites occupy riparian areas. The floodplains associated with these riparian sites are nearly level to gently sloping. High water tables are common near stream channels. As one moves away from the stream channels, the chance of encountering a high water table diminishes.

Most of the proposed treatment sites are located in upland areas. These areas do not have the hydrologic regimes and resulting moisture to support vegetation associated with riparian areas. However, these sites are commonly located along roads or trails which often lead to or drain into riparian areas.

Water Quality

The Sandpoint Ranger District is located within the larger Pend Oreille River Sub-Basin. The Pend Oreille River flows from Pend Oreille Lake

at Sandpoint, Idaho to the Columbia River at Arrow Lake in British Columbia, Canada. Major tributaries of the Pend Oreille River either partially or wholly within the Sandpoint Ranger District are the Pack River and the Clark Fork River.

Pend Oreille Lake is the largest natural lake entirely within the state of Idaho. The lake is over 25 miles long and over 5 miles wide, and is surrounded by both private and National Forest lands within the Sandpoint Ranger District.

Special Designations: Beneficial uses are defined by the Idaho "Water Quality Standards and Waste Water Treatment Requirements, IDAPA 16, Title 01, Chapter 02" (Idaho Department of Health and Welfare, 1994). Beneficial uses for streams in the project area are listed in Table III-2.

Water Quality Limited Segments

The State of Idaho has listed the streams shown in Table III-3 as having Water Quality Limited Segments. Water Quality Limited Segments are portions of streams identified by the Idaho Division of Environmental Quality as not meeting state designated beneficial uses. The identification of Water Quality Limited Segments, and the requirement not to increase identified pollutants of concern, is a requirement of Section 303(d) of the Clean Water Act. Site-specific Best Management Practices (BMPs) have been developed, but do not address herbicide application.

Pack River: Pack River drains approximately 183,000 acres, and flows into Pend Oreille Lake at the Pack River Flats. The Pack River drainage was heavily impacted in 1967, when a major portion of the watershed was burned in a wildfire. The portion of Pack River Drainage proposed for noxious weed treatment is the Harrison Lake trail and campground, and the Beehive Lakes trail. The river channel is considered to have a good stability rating near these treatment sites.

Soils of this area are shallow on the upper slopes with much exposed bedrock. The valley bottom has fine glacial tills and alluvial deposits. These granitic soils are susceptible to surface erosion.

Beneficial uses in the Pack River headwaters include cold water biota and salmonid spawning. Downstream of Highway 95, beneficial uses include agricultural water supply, domestic water supply, cold water biota, salmonid spawning, and primary and secondary contact recreation.

Pack River has been designated as a Water Quality Limited Segment downstream of the Highway 95 bridge. Pollutants of concern are sediment, nutrients, dissolved organics, habitat alterations, pathogens and pesticides. The Water Quality Limited Segment is approximately 15 miles downstream of the proposed treatment areas.

Lightning Creek: Lightning Creek drains approximately 76,900 acres and flows into the Clark Fork River east of Pend Oreille Lake. Lighting Creek is considered unstable. The stream channel carries a large amount of bedload which has caused a braided channel with a cobble streambed. The source of much of this bedload is mass wasting along tributary streams and on slopes above the main channel. Lightning Creek does have a single thread channel in the upper reaches where noxious weed treatment is proposed. Mass wasting has occurred in the Quartz Creek drainage (a tributary of upper Lightning Creek), and riparian harvest has occurred along the upper reaches of Lightning Creek.

Soils in the Lightning Creek Drainage are uncompacted, permeable glacial tills on the sideslopes, often over a compacted, impermeable till layer. These tills are often the sites where mass wasting occurs. Lower slopes have lacustrine, or lakebed, deposits in some areas, such as near the mouth of East Fork Lighting Creek. These soils are less permeable silt-clays. The valley bottom and much of the lowest slopes are composed of permeable alluvial soils (soils deposited by the action of running water), or colluvial soils (material deposited at the base of a slope by the force of gravity).

Table III-2. Designated Beneficial Uses

Creek	Domestic Water	Agricul Water	Cold Water Biota	Salmonid Spawning	Primary Contact Recreation	Secondary Contact Recreation
Fry Cr.	X		X	X		X
Riser Cr.	X	X	X			
Trestle Cr.			X	X		X
Lightning Cr.			P	P		
Moose Cr.			X	X	X	
Johnson Cr.			P	P		
Granite Cr.	X		T	T	X	
Cedar Cr.	X	X	P	P	X	
Tumbledown Cr.			X	X	X	
N. Twin Cr.			X	X	X	
S. Twin Cr.			X	X	X	
Gold Cr.	S	S	T	T	S	S
N. Gold Cr.	X	X	X	X	X	
Johnson Cr.			P	P		
Kirby Cr.	X		X	X		
Pack River Head-waters			P	P		
Fish Cr.	X		X	X		X
Johnson Cr. (Wrenco)	X	X	X	X		

X - Use present, but level of support not rated by DEQ S - Use fully supported P - Use partially supported
T - Use fully supported, but threatened

Table III-3 . Water Quality Limited Segments (WQLS)

Drainage	Pollutant	Priority	Comments
Trestle Creek	Not designated (see footnote 1 below)	Low	
Lightning Creek	Sediment, Flow Habitat Alt.	Low	WQLS is downstream of treatment area
Johnson Creek	Sediment, Flow, Habitat Alt.	Low	
Granite Creek	Sediment	Low	
Gold Creek	Sediment, Habitat Alt.	Low	
Fish Creek	Sediment, Thermal Mod Pathogens,	Low	
Pack River	Sediment, Nutrients, Dissolved Oxygen, Habitat Alt., Pathogens, Pesticides	Low	WQLS is 15 miles downstream of treatment area

Beneficial uses in Lightning Creek include cold water biota and salmonid spawning. Lightning Creek has been listed as a Water Quality Limited Segment by the Idaho Division of Environmental Quality. The pollutants of concern are sediment, flow and habitat alterations. Moose Creek is a tributary of upper Lightning Creek. Its stream stability is rated as good.

Pend Oreille Lake: Pend Oreille Lake is a large, deep oligotrophic (nutrient-poor) lake. Water quality is good. Pend Oreille Lake is used for boating, water skiing, fishing and swimming. The Girard Rainbow trout in Pend Oreille Lake produce a trophy fishery which provides employment for several charter fishing boat companies.

Trestle Creek: Trestle Creek drains approximately 12,500 acres and flows into Pend Oreille Lake. Elevations range from 6,320 feet at the top of Trestle Peak to 2,084 feet at the mouth of Trestle Creek. Soils are primarily permeable glacial tills, though these tills are often over an impermeable, compacted till layer. Water tends to flow between these till layers and come to the surface as small springs on middle and lower slopes.

The Trestle Creek Watershed Analysis, completed in 1994, observed an increase in bedload in the creek as a result of road failures and past riparian timber harvest. This increase in bedload has led to a reduction in available pool habitat for fish. Trestle Creek has been designated as a Water Quality Limited Segment by the Idaho Division of Environmental Quality. The pollutant of concern has not been designated, and the priority for determining the total maximum daily load is low[1].

A major watershed restoration project to reduce the sources of sediment delivery to Trestle Creek was completed in 1997. Trestle Creek is an important bull char spawning stream. Beneficial uses in Trestle Creek include cold water biota, salmonid spawning and secondary contact recreation.

Johnson Creek (Clark Fork): Johnson creek drains approximately 8,900 acres. Field observations in the fall of 1996 revealed fresh bedload deposition in the floodplain, both in the lowest reach and at the confluence with West Johnson Creek. Much of the riparian vegetation was removed several decades ago in the Bonneville Power Administration and Washington Water Power powerline easements.

Johnson Creek drainage has mostly permeable, weakly to moderately weathered Belt Series soils. The lowest reach of Johnson Creek provides spawning habitat for westslope cutthroat trout, rainbow trout and bull char. Johnson Falls, approximately one mile upstream from the mouth of Johnson Creek, is a natural fish barrier. Beneficial uses in Johnson Creek include cold water biota, salmonid spawning and primary contact recreation, with cold water biota and salmonid spawning listed as partially supported.

Granite Creek: The Granite Creek drainage contains 16,712 acres. Channel stability is rated as fair, with some reaches out of dynamic equilibrium[2] due to the large amount of bedload in the stream. A channel which is out of equilibrium is usually characterized by bank erosion, with downcut channels in some areas and large bedload deposits in others. Channels also tend to become wider and shallower when a stream is not in dynamic equilibrium. Some areas in the Granite Creek drainage have a high road density and past riparian timber harvest.

Granite Creek drainage has mostly permeable Belt Series soils.

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[1]The Idaho Division of Environmental Quality (DEQ) is required by the Clean Water Act to assign total maximum daily loads (TMDL) for each pollutant of concern in each Water Quality Limited Segment (WQLS). DEQ has ranked each WQLS as either a high or low priority for determining these total maximum daily loads. Most low priority streams, and many of the high priority streams, do not yet have TMDL's assigned.

[2]Dynamic equilibrium refers to the condition of a stream channel when the major factors of the stream (such as bedload, flow, and channel migration) are in balance.

The Idaho Division of Environmental Quality has listed Granite Creek as a Water Quality Limited Segment. The pollutant of concern is sediment. Beneficial uses in Granite Creek include domestic water supply, cold water biota, salmonid spawning and primary contact recreation. Cold water biota and salmonid spawning are listed as supported but threatened.

The Idaho Department of Fish and Game collects eggs from kokanee salmon at Sullivan Springs on Granite Creek for the fish hatchery at Clark Fork.

Cedar Creek: Cedar Creek drains approximately 5,056 acres, and flows south and west into Pend Oreille Lake. Much of the creek's riparian vegetation has been cleared for agricultural purposes, and a section of the stream channel has been dredged and straightened. Channel stability is rated as fair to good.

Soils in the Cedar Creek drainage include well-drained metasedimentary Belt soils on the middle to upper slopes and well-drained glacial tills on lower slopes. The valley bottom includes poorly drained alluvial soils.

Beneficial uses in Cedar Creek include domestic water supply, agricultural water supply, cold water biota, salmonid spawning and primary contact recreation.

Tumbledown Creek: Tumbledown Creek drains an area of approximately 1,116 acres and flows west into Pend Oreille Lake. Tumbledown Creek is in dynamic equilibrium, though it has a slightly elevated bedload due primarily to sediment delivery from roads. This drainage includes mostly well-drained Belt Series soils. Beneficial uses in Tumbledown Creek are identified as cold water biota, salmonid spawning and primary contact recreation.

North Twin Creek: North Twin Creek drains an area of approximately 1,112 acres and flows southeast into Pend Oreille Lake. Most of North Twin Creek channel is stable, with one less stable reach toward the headwaters. The source of this instability appears to be a lack of vegetative cover due to frequent wildfires. This drainage includes mostly well-drained Belt Series soils. Beneficial uses in this drainage are cold water biota, salmonid spawning and primary contact recreation.

South Twin Creek: South Twin Creek drains approximately 974 acres. Most of South Twin Creek has a channel stability rating of good. One reach has a fair stability rating. This drainage includes mostly well-drained Belt Series soils. Beneficial uses are cold water biota, salmonid spawning and primary contact recreation.

Falls Creek: Falls Creek originates on the north slope of Packsaddle Mountain and flows northwest into Pend Oreille Lake. The drainage area for Falls Creek is approximately 2,894 acres. Falls Creek is in dynamic equilibrium and has an excellent channel stability rating. Falls Creek has well-drained Belt Series soils on the sideslopes and fairly well-drained alluvial silts in the valley bottom. Identified beneficial uses are domestic water supply, cold water biota, salmonid spawning and primary contact recreation.

North Gold Creek: North Gold Creek flows west into Pend Oreille Lake, draining approximately 10,458 acres. The community of Lakeview, near the mouth of North Gold Creek, uses the creek for its public water supply. The geology of North Gold Creek is mostly Belt Series rock, with well-drained soils on the slopes and fairly well-drained alluvial silts near the creek. Beneficial uses in North Gold Creek include domestic water supply, agricultural water supply, cold water biota, salmonid spawning and primary contact recreation.

Gold Creek: Gold Creek flows north into Pend Oreille Lake just south of the town of Lakeview. The drainage area for this creek is approximately 13,871 acres. The geology for this watershed is Belt Series rock with well-drained soils on the slopes and fairly well-drained alluvial silts in the valley bottoms. Six past hard rock mining operations left mine tailings in or adjacent to stream channels in this drainage. These tailings have led to an increase in bedload and have reduced stream stability for many reaches in the drainage. Beneficial uses for Gold Creek are domestic water supply, agricultural water supply,

cold water biota, salmonid spawning and primary contact recreation.

Fry Creek Headwaters: Fry Creek flows from Grouse Mountain west and north to Pend Oreille Lake just south of Sandpoint. Only the headwaters of Fry Creek are on National Forest lands. This headwater drainage covers approximately 1,800 acres. Soils in this area include well-drained till with well-drained alluvial soils near the stream bottoms.

Runoff from roads and grazing on private land downstream of National Forest lands have increased fine sediment and bedload in the creek.

Beneficial uses for Fry Creek are domestic water supply, cold water biota, salmonid spawning and secondary contact recreation. Several single-family domestic water sources are present on Fry Creek downstream of the proposed treatment area.

Fish Creek: Fish Creek is a 6,148 acre watershed flowing east into Cocolalla Creek, which in turn flows into Cocolalla Lake. The geology in the Fish Creek drainage is the Kaniksu Batholith, a granitic formation (p. III-1). Most of the soils are well-drained glacial tills, with some well-drained alluvial soils in the valley bottom.

Several county roads cross Fish Creek with culverts that are fish barriers. Fish Creek historically supported a population of rainbow and westslope cutthroat trout. A severe drought in 1973 dried up most of the creek and may have eliminated most of this fishery.

Beneficial uses in Fish Creek are domestic water supply, cold water biota, salmonid spawning and secondary contact recreation.

Johnson Creek (Wrenco): Johnson Creek, in the Wrenco area, drains approximately 5,400 acres. Johnson Creek flows south into the Pend Oreille River. Soils are well-drained glacial tills over the granitic Kaniksu Batholith. Beneficial uses are domestic water supply, agricultural water supply, cold water biota and salmonid spawning.

Kirby Creek: Kirby Creek drains approximately 1,340 acres. The geology is a mixture of Belt Series rocks and granitics. This rock is fractured in many places. Soils are mostly tills with an ash cap; some of these tills have an impermeable layer. Water flows over this layer and often comes to the surface near exposed rock outcroppings, which are common in this area. Beneficial uses of Kirby Creek are domestic water supply, cold water biota and salmonid spawning. The lower reach of Kirby Creek, downstream of National Forest Lands, supports a population of westslope cutthroat trout and provides several domestic water sources.

Riser Creek: Riser Creek is a steep gradient creek with a watershed that covers approximately 1,350 acres. Stream stability was rated as fair to good in 1974. Large woody debris is plentiful. Soils are glacial tills. The surface layers are permeable, but an impermeable till layer often underlies it. Water will often flow between these layers and surface in small springs lower on the slope. The lower reach of Riser Creek flows subsurface in the summer. Beneficial uses are domestic water supply, agricultural water supply and cold water biota.

Gold Gulch: The Gold Gulch drainage covers approximately 1,298 acres. Gold Gulch and its tributaries are in dynamic equilibrium. Soils are primarily permeable glacial tills. The beneficial use is cold water biota. Large organic debris that is critical to meet channel morphology needs and fish habitat requirements is plentiful in Gold Gulch. However, this creek is in fair to poor condition for fish habitat.

Lakeface Drainages: A number of small drainages feed into Pend Oreille Lake. For the most part, these streams are unnamed. The geology of the Pend Oreille Lake shoreline is primarily composed of glacial tills and alluvium underlain by metasedimentary or granitic rocks.

Pend Oreille River: Originating in Lake Pend Oreille, this river is a major tributary to the Columbia River. According to USGS gauging stations, approximately 97 percent of the inflow to Pend Oreille River and Pend Oreille Lake upstream from Albeni Dam comes from the Clark

Fork River, Lightning Creek, Pack River, Rapid Lightning Creek, Sand Creek and Priest River. The total drainage area of the Pend Oreille River upstream of Albeni Dam is approximately 15.5 million acres.

Domestic Water

Domestic water sources are found scattered throughout the Sandpoint Ranger District downstream of National Forest lands. These sources are surface water intakes and groundwater wells that provide primarily single-family domestic water supplies. Municipal watersheds in the Sandpoint Ranger District are Sand Creek for the city of Sandpoint, Strong Creek for the city of Hope, and North Gold Creek for the city of Lakeview.

Fisheries

Species Management - USDA Forest Service Region One has identified two sensitive species, bull trout (*Salvelinus confluentus*)trout and westslope cutthroat trout (*Oncorhynchus clarki lewisi*), that may be present in the Sandpoint Ranger District (USDA Forest Service 1994). These fish are also considered Species of Special Concern by the State of Idaho.

Bull Trout - The bull trout is now considered a Category 1 species under the Endangered Species Act (1973). The U.S. Fish and Wildlife Service (USFWS) issued a petition finding on June 12, 1997, determining that listing the bull trout is warranted. This means that there are significant threats to the continued existence of the species. The USFWS is in the process of drafting regulations for protection of this species.

Bull trout are found in cold water streams, rivers and lakes. They spawn in late summer through fall (August to November), often in areas of ground water infiltration (USDA Forest Service 1989b). Fry hatch at the end of January and emerge in early spring (April). Juveniles remain near the stream bottom or in low velocity habitat (pools and pocketwater) for the first two years of life. Unembedded substrate and dispersed woody debris are commonly used forms of cover. Most juveniles migrate at the beginning of the third growing season into larger lakes or rivers. Bull trout usually mature at age five to six years. Adult migration begins in early spring (March or April) and may extend through the entire summer. Most fish are in spawning streams by August. Some adults will spawn more than once during their lifetime, but they may not spawn each year.

Existing Habitat Conditions - Table III-4 lists those drainages proposed for noxious weed control where bull trout are present. All of those streams are recognized as having fluvial bull trout populations. The Pend Oreille Lake system has possibly the largest and most stable bull trout population in Idaho. Other strong fluvial populations are found in the Trestle Creek and Gold Creek drainages.

Westslope Cutthroat Trout - Westslope cutthroat trout occur in clear, cool streams, usually with water temperatures below 17 degrees Celsius. Cutthroat habitat contains rocky, silt-free riffles for spawning and slow, deep pools with well-vegetated stream banks for feeding and resting (USDA Forest Service 1989b). The species tends to occupy headwater areas, especially when other salmonid species are present in the same stream (Hickman and Raleigh 1982). Cutthroat trout usually reach sexual maturity at three to four years old. They spawn in the spring, usually in April or May. Fry and juveniles occur in shallow stream sections with slow velocity flows. As fish grow larger and mature, they seek out deep water habitats such as pools and deep runs (Hickman and Raleigh 1982; Baltz et al. 1991). During winter, cutthroat trout typically seek deeper water associated with large woody debris (Moore and Gregory 1988). Strong populations of this species exist in only 36% of its original range in Idaho (Rieman and Apperson, 1989).

Existing Habitat Conditions - Westslope cutthroat trout are present in most drainages of the Sandpoint Ranger District. Table III-4 lists those drainages where westslope cutthroat are present and noxious weed control is proposed. The effects of watershed disturbances, the introduction of exotic fish species, and barriers such as culverts have resulted in fragmentation,

isolation and reduced numbers of westslope cutthroat trout in the project area.

Other Species - In addition to the bull trout and westslope cutthroat trout, streams in the Sandpoint District support sculpins (*Cottus* species), slimy sculpins (*Cottus cognatus*), longnose dace (*Rhinichthys cataractae*), pygmy whitefish (*Prosopium coulteri*), mountain whitefish (*Prosopium williamsoni*), kokanee salmon (*Oncorhynchus nerka*), rainbow trout (*Oncorhynchus mykiss*), Northern squawfish (*Ptychocheilus oregonensis*), pumpkinseed (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), yellow perch (*Perca flavescens*), crappie (*Pomoxis* spp.), lake trout (*Salvelinus namaycush*), brown trout (*Salvelinus trutta*) and brook trout (*Salvelinus fontinalis*).

Table III-4. Fish occupancy by drainage proposed for treatment

Drainage	Westslope Cutthroat Trout	Bull Trout
Cedar Creek	Yes	No
Fish Creek	Unknown	Unknown
Fry Creek	Unknown	Unknown
Gold Creek	Yes	Yes
North Gold Creek	Yes	Yes
Granite Creek	Yes	Yes
Grouse Creek	Yes	Yes
Johnson Creek	Yes	Yes
Johnson Creek (Wrenco)	Yes	Yes
Kirby Creek	Yes	No
Lightning Creek	Yes	Yes
Pack River	Yes	Yes
Riser Creek	Yes	No
Trestle Creek	Yes	Yes
Tumbledown Creek	Yes	No
N. Twin Creek	No	No
S. Twin Creek	No	Fish

Table III-5. Fish occupancy in drainages not currently proposed for treatment

Drainage	Westslope Cutthroat Trout	Bull Trout
Barry Creek	Yes	No
Berry Creek	Yes	No
Cape Horn Creek	Yes	No
Careywood Creek	Yes	No
Caribou Creek	Yes	No
Cascade Creek	Yes	No
Char Creek	Yes	Yes
Cheer Creek	No	Fish
Chute Creek	Yes	No

Drainage	Westslope Cutthroat Trout	Bull Trout
Clark Fork River	Yes	Yes
Cocolalla Creek	Yes	No
Colburn Creek	Yes	No
Dry Creek	Yes	No
East Fork Lightning Creek	Yes	Yes
Gold Creek (by Pack River)	Yes	No
Halfway Creek	Yes	No
Hellroaring Creek	Yes	Yes
Jeru Creek	Yes	No
Kick Bush Creek	No	Fish
Little Sand Creek	Yes	No
McCormick Creek	Yes	Yes
Morris Creek	Yes	No
Mosquito Creek	Yes	Yes
N.F. Grouse Creek	Yes	Yes
Old Maid Creek	Yes	No
Pearl Creek	No	Fish
Plank Creek	Yes	No
Porcupine Creek	Yes	Yes
Quartz Creek	Yes	No
Rapid Lightning Creek	Yes	Yes
Rattle Creek	Yes	Yes
S.F. Grouse Creek	Yes	Yes
Sand Creek	Yes	No
Savage Creek	Yes	Yes
Schweitzer Creek	Yes	No
Smorgasbord Creek	Yes	Yes
South Gold Creek	Yes	Yes
Spring Creek	Yes	Yes
Strong Creek	Yes	Yes
Talache Creek	Yes	No
Trout Creek	Yes	No
Twin Creek	Yes	Yes
W.F. Blue Creek	Yes	No
Wellington Creek	Yes	Yes
West Gold Creek	Yes	Yes
Wylie Creek	Yes	No
Youngs Creek	Yes	No

Information provided in these tables was compiled from North Zone fisheries surveys conducted between 1982 and 1995.

Wildlife

The Pend Oreille Ecosystem provides habitat for a wide variety of wildlife species. To facilitate the management of all wildlife species that occur in the Sandpoint Ranger District and help ensure population viability, the Idaho Panhandle National Forests have selected several species to help assess the impacts of land management decisions on wildlife resources. These selected species are referred to as Management Indicator Species (MIS). MIS include threatened, endangered and sensitive species, and species whose population changes are believed to indicate the effects of management activities on other species with similar habitat requirements.

Threatened and Endangered Species

Animal lists from the U.S. Fish and Wildlife Service (USDI 1997) include five species listed as threatened or endangered that are known or suspected to occur in the Sandpoint Ranger District. These species include the grizzly bear, woodland caribou, Northern gray wolf, bald eagle and peregrine falcon.

Proposed weed treatment sites include recovery areas for the grizzly bear and woodland caribou. Gray wolves could be considered present in most areas of the District because of their wide ranging behavior. Bald eagle habitat is confined to those areas that are associated with larger bodies of water (i.e. lakes and rivers). Mountain cliffs and river canyons are typical nesting habitat for the peregrine falcon.

Sensitive Species

Sensitive wildlife species were designated by the Northern Regional Forester after a status review found current or predicted downward trends in their populations or habitat (USDA Forest Service 1994). Sensitive species likely to be found in the Sandpoint Ranger District include the harlequin duck, common loon, boreal owl, northern bog lemming, Coeur d'Alene salamander, Townsend's big-eared bat, lynx, fisher, wolverine, flammulated owl and black-backed woodpecker.

Other MIS

Other Management Indicator Species include the pileated woodpecker, northern goshawk, marten, elk and white-tailed deer. These species vary in occurrence from uncommon (northern goshawk) to abundant (white-tailed deer). Pileated woodpecker, goshawk and marten generally prefer forests in the advanced stages of succession. Older forests contain complex vegetative structure which allows for niche specialization by these species.

Deer and elk prefer a diversity of vegetative structure interspersed across the landscape. The most common naturally occurring forage habitat for deer and elk is found in open-canopied, drier Douglas-fir and ponderosa pine forests, such as those described above in Vegetative Community Diversity. Scattered open meadows also provide forage habitat. Preferred forage species are primarily native grasses (fescues and bunch-grasses) and forbs, as well as native shrubs (redstem ceanothus, willows, etc.).

Deer and elk also use moist cedar and hemlock forest as forage habitat where canopy openings due to wildfire or timber harvest have stimulated the growth of understory plant species.

Both of the above types of habitat are susceptible to invasion by noxious and undesirable weeds (see Table III-1). For example, forage habitat in the Barton Hump area (sites #41 and #42) has been invaded to varying degrees by spotted knapweed and goatweed. Although there are reports of deer and elk foraging on knapweed (Willard et al. 1988), it is not a preferred forage species.

Throughout the project area, weed infestations along roads and trails adjacent to or within wildlife forage habitat provide a seed source for further invasion of those habitats.

Other Species of Concern

Other species of concern include a diverse group commonly referred to as forest songbirds, including migratory and resident populations. Vegetative structure has long been recognized as

an important factor determining habitat use by avian populations, supporting the concept that bird communities change as vegetative communities change. Many of these birds are insectivorous, while others rely on seeds as a food source. Their habitat requirements vary from dry, rocky slopes to open meadows and other early stages of vegetative growth, to densely forested areas. Approximately 150 species of songbirds occur within the elevation range of the proposed treatment sites.

Human Resources and Human Health

In general, the presence of noxious and undesirable weeds does not pose significant health threats to a large portion of the population. However, some individuals are affected by allergies and minor skin irritations from certain weed species. For example, leafy spurge contains a latex-bearing sap which irritates human skin and can cause blindness in humans upon contact with the eye (Callihan et al. 1991). Some species of weeds, such as the thistles, cause minor scrapes and irritations.

Hand-pulling weeds can cause minor skin irritations in circumstances where gloves are not used. The sap of Russian knapweed sap contains a known carcinogen. Spotted knapweed sap may also be carcinogenic (Niehoff 1997).

Exposure to herbicides currently used by state, county and private landowners also may result in a reaction in some people. The possibility of an illness or accident occurring from exposure to a herbicide varies from person to person, but is considered to be low. The potential for impacts is dependent upon the herbicide used, the method of application and the size of the treated area.

Chapter IV
Environmental Consequences

Introduction

This chapter discloses potential environmental consequences of the proposed action and alternatives. Analysis of Alternative A describes the predicted effects of maintaining current levels of noxious weed management in the Sandpoint Ranger District. Analysis of Alternative B outlines potential effects of using mechanical, cultural, and biological control agents. Analysis of Alternative C discloses predicted effects of treating noxious weeds with herbicides in addition to mechanical, cultural, and biological controls. Alternative A provides a base line for comparing the effects predicted under implementation of Alternatives B and C.

The effects analysis discussion follows the same general outline as Chapter III, Affected Environment. For full disclosure of potential environmental consequences, this chapter concludes with discussion of the following items as required under NEPA:

- unavoidable effects,
- possible conflicts with other jurisdictions,
- irreversible and irretrievable commitment of resources.

State and County Weed Control Activities

Alternative A: No Action Without a comprehensive strategy for prioritizing and treating weed infestations in the District, opportunities for cooperative efforts with state and county agencies could occur but would be limited. Weed infestations on National Forest lands that were not successfully treated would spread to adjacent lands under other ownership, compromising any weed control efforts on those lands.

Alternative B: Mechanical, Cultural and Biological Treatment Cooperative efforts with state and county agencies as well as private landowners would facilitate control of weeds on National Forest lands in the District adjacent to lands under other ownership. Cooperative educational and training opportunities would also be pursued.

Any future control of noxious weeds along county roads within the district would utilize a combination of mechanical, cultural and biological methods.

Alternative C: Mechanical, Cultural, Biological and Chemical Treatment
Cooperative efforts with state and county agencies as well as private landowners would facilitate control of weeds on National Forest lands in the District adjacent to lands under other ownership. Cooperative educational and training opportunities would also be pursued.

Future control of noxious weeds along county roads within the district would use a fully integrated weed control program, including the use of herbicides.

Forest Plan Consistency The Forest Plan directs that weed control be conducted in cooperation with counties, other agencies, and private landowners. All alternatives would be consistent with the Forest Plan.

Existing Weed Infestations

The rationale for determining the predicted effectiveness of Alternatives B and C is explained in Appendix J.

Effects Common to Alternatives A and B

Herbicides would be available for treatment of new weed invaders, but their use would be limited. The IPNF Weed Management EIS directs that the total Forest-wide use of herbicide treatments on new invaders will not exceed five

acres per year. It would be expected that Sandpoint Ranger District's portion of that five acres would be considerably less than the actual amount of new infestations.

Alternative A: No Action Alternative A would be minimally effective in controlling existing populations. Large infestations of orange and meadow hawkweed would not be treated because of the excessive cost and the unlikely prospect of success with currently available methods. These large populations would continue to spread throughout the district along road corridors. They would continue to serve as a significant source of noxious weed seed infestations into the surrounding landscape.

The limited release of biological control agents into large infestations of spotted knapweed and goatweed would lessen the rate of spread in some areas, but would not be likely to result in significant control of most infestations.

Without a comprehensive weed treatment and monitoring plan and adaptive strategy for the district, most treatment efforts would not be successful.

The long-term effect of implementation of Alternative A would be that, as weed infestations become larger and more widespread, the cost of control would increase, while the chance of success would diminish. New invaders not successfully treated would likely become naturalized in the ecosystem and, once established, would be difficult or impossible to eradicate.

Alternative B: Mechanical, Cultural and Biological Treatment Alternative B would have the effect of controlling some weed populations, but many infestations would continue to spread. Large infestations of spotted knapweed and goatweed would be treated by a combination of biological agents. Mowing would be used along road rights-of-way to control noxious weeds, especially spotted knapweed and goatweed. This treatment also would be used in roadside infestations of common tansy. Mowing may reduce seed production in these species, slowing their rate of spread. However, spotted knapweed often responds to mowing by flowering at progressively lower heights to continue seed production, so that mowing must be repeated several times every growing season to effectively reduce seed production.

Within some locations, mechanical and cultural control could eliminate infestations of knapweed (Lacey et al. 1995), houndstongue and goatweed. Houndstongue can be eradicated if plants are pulled in the first year, since flowering occurs in the second year. Small infestations of knapweed and goatweed can be eradicated if a sufficient portion of the taproot and lateral roots are removed. However, all three species are prolific seed producers; seed reserves in the soil can remain viable for more than ten years. Disturbed soil around pulled plants would provide a seedbed for the germination of weed seeds. Therefore, hand-pulling would have to continue over many years to be highly effective. Revegetation of areas disturbed during mechanical control (see Chapter II, Features Common to All Alternatives) would enhance the effectiveness of these control methods.

Mechanical control methods would have limited success in smaller infestations of meadow and orange hawkweed and dalmatian toadflax. Hand-pulling may stimulate growth and spread by providing a disturbed seed bed, and by fragmenting rhizomes that are left in the soil. Biological control agents are currently not available for the hawkweeds.

Mechanical control is typically unsuccessful in treating Canada thistle infestations. This species has an extensive root system and sends out new shoots from numerous buds on lateral roots. Three or more pulling sessions per year may reduce the competitive advantage of Canada thistle. However, Canada thistle infestations would not be eradicated with mechanical or cultural treatment. The infestations would continue to fill in through vegetative reproduction in spite of a rigorous hand-pulling program. There would be a high risk that Canada thistle would continue to spread vegetatively.

With full implementation of this alternative, most weed populations would not be brought under

control, either due to infestation size or individual weed species ecology. Monitoring of past mechanical and biological methods in the Priest Lake Ranger District (USDA 1997, pp. III-2, 3) indicates that these methods alone have not been successful in controlling populations. While cultural treatments in conjunction with these methods increases the likelihood of control, most weed populations would not be effectively controlled.

Based on the extent of each infestation and the weed species present at each site, it is estimated that infestations would be eradicated or greatly reduced on 25 sites encompassing approximately 440 acres, or 38 percent of the proposed treatment acreage.

The long-term effect of implementation of Alternative B would be a reduction of some weed species considered to be naturalized within the ecosystem. Biological control of spotted knapweed and goatweed would help to reduce the size of some infestations. However, changes in population size and distribution would not be noticeable for many years. Infestations of those species and of ox-eye daisy, Canada thistle, sulfur cinquefoil and dalmatian toadflax along roads and trails would continue to provide a seed source for weed spread.

Orange and meadow hawkweed would continue to increase, and would become more difficult to control as populations increase in size and distribution. In addition, new invaders not successfully treated would likely become naturalized in the ecosystem and, once established, would be difficult or impossible to eradicate.

Where weed infestations are successfully eradicated, follow-up treatments and monitoring of treated infestations, along with revegetation with desired plant species, would reduce the likelihood of reinfestation.

Alternative C: Mechanical, Cultural, Biological and Chemical Treatment The use of herbicides and mechanical, cultural and biological methods would not result in the total elimination of noxious weeds from the district. However, this alternative would eradicate several weed populations, and would effectively reduce the size and rate of spread of other infestations.

Mechanical control would be used only at those sites where effective weed control is predicted (i.e. small infestations of certain weed species). Thus, this control method would be more successful under Alternative C than under Alternative B (see Appendix J). The effectiveness of cultural and biological control methods would be the same as under Alternative B.

Initial use of herbicides in some populations would likely require less follow-up treatment. Herbicide use in orange and meadow hawkweed infestations would offer a much greater chance of success than other control methods. The combination of chemical and biological control of spotted knapweed, goatweed, ox-eye daisy, Canada thistle, sulfur cinquefoil and dalmatian toadflax would reduce their occurrence along roads and trails. By effectively reducing weed populations along travel corridors, the incidence of weed spread would decrease.

Follow-up treatments and monitoring of treated infestations, along with revegetation with desired plant species, would reduce the likelihood of reinfestation.

Based on the extent of each infestation and the weed species present at each site, it is estimated that weed infestations would be eradicated or greatly reduced on approximately 41 sites of approximately 828 acres. This represents 70 percent of the proposed treatment acreage. At other sites, the risk of weed spread to uninfested areas would significantly decrease.

Forest Plan Consistency The Forest Plan directs that noxious weed control would include the current levels of inventory and monitoring, and mechanical, cultural and biological control. Alternative A would continue such efforts. Alternatives B and C would be consistent with the Forest Plan by offering a more fully integrated approach to weed management.

Vegetative Community Diversity

Alternative A: No Action This alternative would have no direct effects on vegetative communities within the ecosystem since weed control activities would not change from current levels.

There would be no immediately apparent impact on vegetative community diversity. However, given the moderate to high susceptibility of most vegetative communities within the ecosystem to invasion by the weed species of concern (see Table III-1), it would be expected that existing weed populations would continue to spread into new areas, in many cases with or without disturbance.

Orange and meadow hawkweed infestations would continue to invade moist forest and wetland habitats, displacing less competitive native species. Spotted knapweed, goatweed, common tansy, sulfur cinquefoil, dalmatian toadflax, ox-eye daisy and Canada thistle would also increase in density and distribution. Houndstongue, known currently from only one site in the District, would spread rapidly, and future control of this species would be very difficult and costly.

As noxious weeds spread, the negative indirect impact on native plant communities would become increasingly apparent. Corridors such as trails and roadsides would become increasingly infested with noxious weeds. Many vulnerable habitats would likely become dominated by noxious weeds.

Planty-Tabacchi et al. (1996) found that the diverse habitats and shifting dynamics of riparian zones make them uniquely susceptible to weed invasions. The researchers also determined that the richest plant communities along a river system were most vulnerable to invasion by weeds.

Several researchers have demonstrated that the actual number of native species, as well as their total biomass, would decrease in locations infested by noxious weeds. Belcher and Wilson (1989) found seven to eleven other species in locations free of leafy spurge, but only four other species within areas infested by leafy spurge. Tyser and Key (1988) reported significant reductions in species diversity in knapweed-infested fescue grasslands surveyed within Glacier National Park.

The long-term effect of implementation of Alternative A would be that, as weed infestations become larger and more widespread, some native species would be eliminated from their habitats, and native plant species diversity in many areas would decline. Most noxious and undesirable weeds would in effect be considered as naturalized within the ecosystem.

Alternative B: Mechanical, Cultural and Biological Treatment Only modest success in controlling weed infestations could be expected with full implementation of this alternative.

No direct effects to vegetative communities within the ecosystem would occur. There would be no immediately apparent impact on vegetative community diversity. Through a diligent program of mechanical and cultural control, some sites would have native plant diversity maintained or restored. In addition, control of weed species at these sites would reduce or eliminate their spread to other areas. However, vegetative diversity in many sites would decline as weed populations expand.

The long-term effect of Alternative B would be similar to that of Alternative A, but it would take longer for vegetative community diversity to decline under this alternative than under Alternative A.

Alternative C: Mechanical, Cultural, Biological and Chemical Treatment The effects of mechanical, cultural and biological treatments on vegetative community diversity would be similar to those discussed under Alternative B. The higher predicted effectiveness of mechanical control under this alternative would provide greater long-term protection of vegetative community diversity than Alternative B.

Implementation of this alternative would not produce immediately apparent impacts to vegetative community diversity. However, full implementation of this alternative would likely reverse the trend toward noxious weed dominance at many of the 46 sites.

A fully integrated approach to noxious weed treatment would be the most effective weed control method (Bechinski 1992 and Everett 1994). Therefore, this alternative, combined with an aggressive prevention and education program, would provide the greatest long-term protection of vegetative community integrity.

As discussed under Alternative A, the failure to control noxious weeds on most of the 46 sites would increase the probability that noxious weeds would spread to new sites. Likewise, the risk of weed spread would remain high at sites in which weeds are only partially controlled (for example, through mechanical treatment of hawkweeds as described in Alternative B). The probability of spread is compounded as weeds colonize new sites, which then become seed sources for even further population expansion. Under Alternative A and, to a lesser extent, Alternative B, weed populations would continue to increase.

By contrast, the impacts of herbicides on vegetative biodiversity tend to be much more easily confined to the site of application. Although herbicides would directly affect some non-target plant species at the site of application, the long-term effect on native plant communities would be beneficial. Short-term impacts to vegetative diversity would be purely additive across the relatively few acres that would be sprayed.

Herbicides such as picloram and 2,4-D are often perceived as greatly reducing the diversity of plant species on a treated site. For example, picloram is thought to create a grass monoculture at the expense of broadleaf species. This is somewhat overstated. Two studies have been conducted in western Montana to measure the impact of herbicide application on native species. Willard et al. (1988) measured the impact of picloram on native grasses and broadleaf species. With the control of noxious weeds, the grass species generally showed marked increases. Some broadleaf species such as arnica and yarrow were greatly reduced. Generally, members of the Asteraceae (composite family), Fabaceae (legume), Polygonaceae (buckwheat), and Apiaceae (parsley family) were affected by picloram. Members of the Brassicaceae (mustard family), Liaceae (lily family), and Scrophulariaceae (figwort family) were less affected by the herbicide.

In a more extensive study, Rice et al. (1992) compared the impacts of the herbicides 2,4-D, picloram and clopyralid to the impact of knapweed invasion on species number and diversity. The knapweed sites were in the initial stages of infestation, thus the diversity on these sites had not suffered as much as in studies cited above by Tyser and Key (1988). Although the untreated knapweed plots in Rice's study started with slightly higher numbers of species and diversity, within two years the species number and diversity were virtually identical on all plots. Initially, the impact to species was greater on sites sprayed with picloram than on sites sprayed with clopyralid.

Clopyralid affects members of only three plant families -- the composites, the legumes, and the buckwheats. Thus, this herbicide can be sprayed near tree, shrub, and forb species that might be affected by picloram.

On-site impacts to vegetation not withstanding, herbicide application as proposed would have the benefit of reducing sources of further weed spread to currently uninfested areas. Although herbicide application would have small and transitory impacts on some non-target vegetation at treated sites, it would prevent much more serious, long-term effects on many susceptible communities within the ecosystem.

Forest Plan Consistency All Alternatives would be consistent with the IPNF Forest Plan, at least within the next 5-10 years. The Forest Plan directs that management activities provide for a diversity of plant communities.

Threatened, Endangered and Sensitive Plants

Alternative A: No Action Under this Alternative, there would be no direct impacts to sensitive plant populations or suitable sensitive plant habitat within or adjacent to the Sandpoint Ranger District, since weed control practices would not change from current levels.

Given known occurrences of sensitive plant populations and the current condition of highly suitable habitat, the No Action Alternative is not expected to significantly reduce population viability or cause a trend to Federal Listing of any sensitive species within the next five to ten years.

However, sensitive plant species which are associated with low-level soil disturbance could face increased competition for their habitat from the more aggressive noxious weeds. For example, the populations of fringecup within the Trestle Creek drainage (site #6) could be outcompeted by encroaching weeds colonizing disturbed soils resulting from stream channel migration.

Because weed infestations would continue to spread (see Chapter IV, Vegetative Community Diversity), some sensitive plant populations could be imperiled. For example, peatland habitat near Lost Lake (site #29) would have a high risk of invasion by orange and meadow hawkweed. The populations of crested shield fern and bulb-bearing water hemlock could be outcompeted by these aggressive weeds, and could be eliminated from their habitat.

While no loss of sensitive plant population viability is expected within the next five to ten years, it is important to consider that early detection and control are critical steps to successful weed management (Hobbs and Humphries 1995). This is particularly true in peatland habitats. Large infestations of orange and meadow hawkweed would be extremely difficult to eradicate from a peatland substrate. Removal of the total root mass of a large infestation, besides impacting individual sensitive plants, could cause extensive disturbance to the substrate, from which recovery would be slow (Bursik and Moseley 1995). Therefore, untreated infestations of these species which invade peatland habitats *could eventually* cause a loss of population viability for some sensitive peatland species.

Meadow and orange hawkweeds have also been observed in moist forest habitats. Existing populations would most likely continue to spread into these areas. Populations of the hawkweeds and Canada thistle would most likely spread in riparian and peatland habitats throughout the district, as these areas act as natural travel and linkage corridors. Most of the sensitive plants known to occur in the Sandpoint Ranger District are associated with moist forest, riparian and peatland habitats. Therefore, if noxious weed populations continue to grow and spread in these habitats, a long-term cumulative reduction in sensitive plant habitat capability would be expected.

Alternative B: Mechanical, Cultural and Biological Treatment Weed treatment criteria outlined in this document would protect documented sensitive plant occurrences. There would be no direct impacts to identified sensitive plant occurrences during weed treatment on the 46 proposed sites. Future treatment sites would be assessed for suitability as sensitive plant habitat, and would be surveyed as needed prior to treatment. Treatment of additional infestations under the adaptive strategy may necessitate a short-term loss of isolated individuals, primarily from marginal habitats, to protect the integrity of some weed-free habitats and core populations of sensitive plants. Impacts to individuals would not be expected to cause a loss of population or species viability or lead to federal listing of any sensitive plant species.

Mechanical control of orange and meadow hawkweeds might be successful, provided that treatment efforts removed all of the root mass. Removal of the entire root mass would require repeated, labor-intensive treatments. Given the heavy infestation of hawkweeds near Lost Lake (site #29), there is a high risk that hawkweeds would eventually spread to peatland habitat that supports bulb-bearing water hemlock and crested shield-fern. As noted in Chapter III, if

hawkweeds became widely established in the peat substrate, they would be extremely difficult to eradicate and could eventually cause the elimination of sensitive species near Lost Lake.

Biological control of knapweed and dalmatian toadflax is not expected to impact any known sensitive plants directly or indirectly. The biological agents have been tested for host specificity, and have a very narrow selection range. Biological control agents for Canada thistle are less host-specific and will impact native species of the genus *Cirsium*. However, there are no sensitive plant species within the ecosystem closely related to Canada thistle.

Biological control agents for goatweed are more general, and have been observed feeding on both native and exotic *Hypericum* species (see Chapter III). Although the biological agents prefer the weed species, there is the potential for impacts to populations of the sensitive large Canadian St. Johnswort if the agents are released in nearby goatweed populations (Bergman 1996).

No releases of the biological control agents for goatweed would occur in or near known populations of large Canadian St. Johnswort, or where a contiguous goatweed infestation would allow the agents to travel to a population of the sensitive species. There would be no impacts to any populations of this sensitive species in the Sandpoint Ranger District.

If fully implemented, this alternative would slow the rate of spread of some weed populations. However, because many infestations would not be controlled or eliminated, a long-term cumulative reduction of suitable sensitive plant habitat would be expected. Population viability of vulnerable sensitive plant populations could eventually be reduced. As with Alternative A, this impact is not expected to occur within the next five to ten years.

Alternative C: Mechanical, Cultural, Biological and Chemical Treatment There would be no impact to sensitive plant species from treatment of the 46 sites as proposed under this alternative. Herbicide treatment on future sites under the adaptive strategy could result in the direct loss of sensitive plant individuals, particularly those at the periphery of established populations. Loss of individuals would not reduce population viability or lead to Federal listing of any sensitive plant species. As with mechanical and cultural control, site-specific treatment criteria would be designed to protect the viability of known sensitive plant populations. Herbicide spot-spraying, under conditions outlined in the design criteria, would allow effective weed control with little or no impact to sensitive plant populations or habitat.

All known sensitive plant populations would be buffered from herbicide application. Future treatment sites would be assessed for suitability as sensitive plant habitat, and would be surveyed as needed prior to treatment. Recommended buffers and treatment criteria for riparian and aquatic sites would prevent indirect effects to sensitive plants or suitable habitat in these areas.

Successfully eliminating or controlling a majority of weed populations would protect and enhance suitable habitat for sensitive plants. No negative cumulative impacts to sensitive plants associated with chemical weed control are expected.

Forest Plan Consistency The IPNF Forest Plan directs that the habitat of sensitive plant species be managed to prevent further declines in populations which could lead to Federal listing under the Endangered Species Act. Alternatives A and B would be consistent with this direction over the next five to ten years; however, long-term impacts to crested shield-fern and bulb-bearing water hemlock from orange and meadow hawkweed infestations near Lost Lake (site #29) could result in eventual elimination of those sensitive species from that site. Alternative C would be consistent with Forest Plan direction.

Soils and Aquatic Resources

Treatments to control noxious weeds would have negligible effects on soils within the Sandpoint Ranger District. However, soil characteristics in a given area can have some influence on the treatment method chosen for a particular site.

Soil properties can also lead to indirect effects on other resources, such as the water retention or percolation capacity at a particular site. Because this can influence the hydrology and consequently the fishery in a drainage, these resources are discussed together.

The following analysis focuses on the toxic characteristic of each herbicide proposed for use, the concentration of herbicides to which aquatic biota (fish and invertebrates) are exposed, and the impacts to water quality from the alternatives. Differences in treatment were used to contrast effects on habitat between alternatives and to determine the potential impacts to fish, macroinvertebrates and water quality. Effects analysis was based upon field reviews, watershed conditions, riparian zone conditions, professional consultation, literature reviews and the professional judgement of the project aquatics specialist.

Alternative A: No Action As discussed previously, without treatment it becomes increasingly likely that noxious weeds will become more widely established across the Sandpoint Ranger District. An indirect effect of noxious weed invasion could be an increased water runoff and sediment yield from infested sites. Lacey et al. (1989) have shown an almost three-fold increase in sediment yield from knapweed sites compared to an uninfested bunch grass site. Runoff increased by about 50 percent from the knapweed site.

At the present time, most infested sites are along road clearings. Noxious weeds are probably having little effect on sediment yield in comparison to other road-related activities (road use, maintenance, etc.). Impacts from the future spread of weeds would depend on the slope, soil characteristics, precipitation patterns, and distance to water from the infested sites. Even under the worst-case noxious weed infestation scenario, it is unlikely that increase in sediment yield to streams would be sufficient to affect fisheries or water quality.

Alternative B: Mechanical, Cultural and Biological Control Mechanical treatment could result in localized soil disturbance. An increase in sediment to streams from mechanical treatment along road cuts and fills and within riparian areas is possible, but the increase would likely be undetectable for several reasons. First, disturbed areas would be reseeded with desirable species after treatment, reducing erosion as roots became established. Second, not all sediment reaching ditchlines would be transported directly to streams. Many ditchlines are intercepted by relief culverts which drain onto the forest floor. Finally, project-related soil disturbance would be minimal and localized in comparison to the entire watershed.

Cultural treatments (seeding, transplanting and fertilizing) would not affect fisheries or water quality. Fertilizers would be applied according to Forest Service and manufacturer guidelines. Runoff nutrient concentrations would not be large enough to enrich streams. Seeding and transplanting would involve limited soil disturbance.

Release of biological control agents would have no direct effect on fisheries or surface water quality. These agents would not compete with aquatic insect species since their food base is very specific, nor would they provide more than an incidental food source for fish. There are no cumulative effects associated with this alternative.

Because long-term effectiveness of this alternative is similar to that predicted for Alternative A, impacts on sediment yield from future spread of weeds associated with this alternative would be essentially the same. Even under the worst-case noxious weed infestation scenario, it is unlikely that increase in sediment yield to streams would be sufficient to affect fisheries or water quality.

Alternative C: Mechanical, Cultural, Biological and Chemical Control Effects to aquatic resources from mechanical, cultural and biological treatments would be the same as those for Alternative B.

The herbicides proposed for use are characterized by relatively low aquatic toxicity. The 96-hour LC_{50} for the seven herbicides (plus the parent

compound of 2,4-D amine) is provided in Table IV-1. The 96-hour LC_{50} refers to the concentration that is lethal to 50 percent of the fish exposed at that level for 96 hours. The lower the LC_{50}, the more toxic the compound.

Although the LC_{50} is frequently used as a toxicity standard, fifty percent fish mortality is generally not acceptable. Because we often do not have long-term test results that provide safe concentrations or no-observable-effect levels (NOEL)[3], the EPA has recommended that the 96-hour LC_{50} be divided by 10 to set a standard for concentrations to protect aquatic species (U.S. EPA 1986). Table IV-1 provides these concentrations, which are used as a benchmark to judge the significance of possible impacts. Note that the NOEL for picloram developed from long-term laboratory studies corresponds fairly closely to the LC_{50} divided by 10.

To predict potential water quality impacts of herbicide applications on the sites under consideration, it is important to distinguish between infiltration-dominated sites and runoff-dominated sites. In all but the most severe conditions, rainfall percolates into the soil on an infiltration-dominated site. On a runoff-dominated site, rainfall is more likely to produce overland flow. These two classes of sites are differentiated on the basis of vegetative cover, soil type, degree of disturbance and compaction, and slope.

The majority of the proposed treatment sites are on road prisms, road cuts and road fills--all of which are runoff-dominated. Treatment areas that are not runoff-dominated would be any sites not associated with a road or trail (for example, the powerline right of way).

Table IV-1 Toxic Levels of Herbicides to Fish

Herbicide (test species)	96 hour LC50 (milligram/liter)	LC50 divided by 10	NOEL (milligrams/liter)
Picloram	3.5	0.35	0.29
2,4-D acid (parent compound) (cutthroat trout)	24	2.4	not available
2,4-D amine (rainbow trout)	420	42	not available
Glyphosate (rainbow trout)	140	14.0	not available
Dicamba (rainbow trout)	28	2.8	not available
Clopyralid (rainbow trout)	103	10.3	not available
Metsulfuron Methyl (rainbow trout)	150	15.0	not available
Triclopyr (rainbow trout)	117	11.7	not available

Notes: 2,4-D dicamba, and picloram values are taken from Mayer and Ellersieck, 1986 and Woodward 1976 and 1979. Clopyralid value is from Dow Chemical Company 1986. Triclopyr and metsulfuron methyl value is from USDA 1992. Glyphosate value is from USDA 1983. 2,4-D acid is the parent compound which is formulated in a variety of forms, including the amine which would be used under Alternative C.

[3] A no-observable-effect level (NOEL) is the highest dose in a particular test that did not result in adverse health impacts to the test organism.

Roads enhance runoff by concentrating flows on compacted road surfaces and in ditches, intercepting groundwater flow from cut slopes. The use of coarse material with low organic matter to create road fill slopes also increases runoff. Treatment sites characterized by undisturbed forest/grassland soils were determined to be infiltration-dominated.

The amount of herbicide that could possibly reach a stream was estimated based upon whether a site was runoff- or infiltration-dominated. An assessment by Rice (1990) reviewed numerous studies of picloram runoff to streams. It was determined that a maximum of ten percent of the herbicide applied on a runoff-dominated site could be lost to the stream in a six-hour period. However, only one percent of herbicide applied on an infiltration-dominated site could be lost to the stream in a six-hour period.

Because of its relatively long environmental persistence and relatively high soil mobility, picloram represents the worst-case scenario of a highly mobile herbicide. A report by Scott et al. (1977), of the US Fish and Wildlife Service, concluded that a concentration of 0.6 parts per million (ppm) picloram decreased cutthroat fry growth by 25 percent. No adverse effects were observed when concentrations were below 0.3 ppm. Woodward (1979) concluded that picloram increased the mortality of fry in concentrations above 1.3 ppm and reduced their growth in concentrations above 0.61 ppm when exposure exceeded 20 days.

On this basis, the worst-case concentrations of herbicide can be calculated for drainages in the vicinity of the proposed treatment sites. For the purpose of this analysis, the entire herbicide application was calculated per drainage as if weeds were sprayed continuously along each road in just one day instead of over one or two months. Furthermore, it was assumed that a severe thunderstorm could wash 10 percent of the active ingredient into the stream on runoff-dominated sites over a six-hour period. Continuing with the worst-case scenario, the lowest streamflow was calculated for all affected waters and used to determine maximum concentration of herbicides within the streams.

The lowest stream flows generally occur in the beginning of October, just prior to fall rains. Though October flows would be the lowest, all spraying would occur between May and August when flows are higher. Streamflow data was calculated using Embry's (1981) water yield formula. Embry's equation was used to calculate the average cubic feet per second (cfs) of water yield for a seven-day, two-year low flow (September and October). This flow information was used to calculate concentration levels of the herbicides within the water bodies. See Table IV-2 for results.

The highest concentrations of herbicides were in the smallest streams and springs. In terms of named drainages, the Cedar Creek drainage showed the highest concentration of all herbicides proposed for use (Table IV-2), due to the high amount of acreage proposed for treatment. However, these concentrations are for the worst-case scenario, and they are still well below the estimated NOEL. Worst-case scenario concentrations calculated in Table IV-2 are well below these documented effect levels or the 0.29 milligrams per liter (mg/l) concentration listed in Table IV-1.

Again, it should be emphasized that these calculations represent the *worst-case* scenario; the likelihood that these concentrations would be reached is very low. In fact, it is unlikely that any herbicide would be detected in stream water as a result of proposed herbicide applications, because of the low level of herbicide use spread over a period of two months or more compared to the higher water yields in these drainages over the same period of time. Application of site-specific Best Management Practices (BMP's) would further reduce the likelihood of herbicide being detected in stream waters.

Concentrations for 2,4-D, dicamba, clopyralid and metsulfuron methyl entering streams under a worst-case scenario are also low (Table IV-2). The highest concentrations of these chemicals are far below the LC_{50} divided by 10 value reported

in Table IV-1. Glyphosate, an herbicide with a very low soil persistence and mobility, is not identified for use in treating any of the existing sites proposed for treatment, but may be proposed for use on noxious weed sites in the future. Triclopyr, a chemical with a very high NOEL concentration, is also not identified for use in treating any of the proposed sites, but may be used on future noxious weed sites.

Application rates would follow Inland Native Fish Strategy (INFISH) Standard and Guideline RA-3, and existing IPNF Weed EIS and State of Idaho Best Management Practices (BMP's) guidelines, for herbicide use within Riparian Habitat Conservation Areas (RHCAs)[4].

Table IV-2. Herbicide Concentrations mg/l (ug/l): Worst Case Scenario

Drainage	Picloram	2,4-D	Dicamba	Clopyralid	Metsulfuron Methyl
Big Grouse So.	0.0237582	0.1978632	0	0	0.01072519
Upper Fry Cr	0.0127411	0.1038968	0	0	0
Trestle Cr	0.0208751	0.0835005	0	0.0288596	0.00335157
Riser Cr	0.0682557	0.5565901	0	0.1365113	0
Gold Gulch	0	0.0538643	0	0.0130942	0
Mineral Point	0	0.1662172	0	0.0393372	0.06852545
Pack River Headwaters	0	0.0108162	0	0.0029494	0
Upper Lightning Cr	0	0.0433538	0	0.0112162	0.00238600
Moose Cr	0	0.0601312	0	0.0152149	0.00395587
Fish Cr	0.0329279	0.2603372	0	0	0.01712251
Johnson Cr (Wrenco)	0.0087960	0	0	0	0
Beehive Cr	0	0.0206353	0	0.0052455	0
Kirby Cr	0.0982068	0.8079644	0	0.1964136	0
Gold Cr	0.1011137	0.0009562	0	0.0002486	0.05257913
Twin Cr	0	0	0	0.0162879	0.00423485
Johnson Cr	0.1180835	0.0138077	0	0.0035249	0.06140343
Tumbledown Cr	0.1627869	0	0.0021691	0	0.08464921
NS Twin Crs	0.0973304	0	0	0	0.05061183
N Gold Cr	0.0465446	0.2058587	0	0.0527990	0.02420318
Granite Cr	0.0849410	0	0	0.0099399	0.04416933
Falls Cr	0.0387750	0	0	0.	0.02016301
Cedar Cr	0.1707999	0.3811289	0	0	0.08881594
Lost Lake	0	0	0	0	0.007
Pend Oreille Lake	0	0	0	0	0.00000006
Moose Lake	0	0.002	0	0.000054	0.000054
Harrison Lake	0	0.00072	0	0.00037	0

Note: All sites are run-off dominated with the exception of the powerline right of way site, which is infiltration dominated and 1% of the herbicide is assumed to reach the water body in this analysis. Run-off dominated sites are assumed to introduce 10% of the applied herbicide to the stream. These factors are much higher rates than would normally be expected. Lake sites are assumed to have 10% of the herbicide mix with 5% of the water as suggested in Rice 1990.

[4] RHCAs are areas defined by INFISH which include riparian and adjacent areas where INFISH guidelines must be met.

Therefore, herbicide concentrations in streams smaller than those identified above are not expected to reach NOEL levels. An explanation of the formula used to determine the concentration in surface water for each drainage can be found in the project file.

When herbicides are applied, there is often concern that they will bioconcentrate in organisms through uptake and retention by tissue or gills. For this to occur, retention of a pollutant must exhibit a high resistance to breakdown or excretion by an organism to allow a sufficient uptake period for an elevated concentration. A high concentration must also be applied for an extended period of time. In terms of the amount and timing of this project's application of herbicides, there is a low risk of bioconcentration.

Concern has been expressed over the possible cumulative or synergistic effects of mixtures of chemicals on sensitive resources. Synergism is a special type of interaction in which the combined effect of a certain herbicide with other chemicals in the environment is greater than the effect of any one chemical alone. This issue is discussed in greater detail in the section on Human Health Impacts. As noted there, EPA currently supports an additive model in predicting such interactions. Even with the assumption that the chemicals are present simultaneously, their additive concentrations are still well below the NOEL thresholds. Furthermore, where more than one herbicide is applied, the amount of each chemical would be reduced (Klarich 1997). Due to the negligible doses expected from implementation of Alternative C, synergistic effects are not expected.

Other Sensitive Aquatic Biota

Herbicides can also indirectly influence fish populations by affecting the populations of other organisms upon which fish are dependent. Table IV-3 provides toxicity data for other aquatic organisms (e.g. macroinvertebrates). As indicated in Table IV-3, these herbicides are generally less toxic to lower orders of aquatic organisms than to fish species. Although the species listed in Table IV-3 are not the only aquatic organisms found in these waters, they are used by the U.S. Fish and Wildlife Service and the EPA as indicators of a wide range of aquatic organisms. Again, the worst-case concentrations of the herbicides in water are well below levels that would affect these organisms.

Adaptive Strategy

New sites proposed for future treatment must meet the requirements of the adaptive strategy (see Chapter II). The adaptive strategy includes parameters established by the project aquatics specialist to ensure that future herbicide treatment falls within the scope of this EIS relative to aquatic resources. The parameters require that the combined treatments in any drainage would result in a concentration of herbicide in surface water lower than the NOEL for each given treatment year.

Combined with the design criteria (Chapter II) and herbicide application guidelines (Appendix D), use of these parameters would protect aquatic resources from the potential effects of herbicide treatment. No adverse effects to soils or aquatic resources would be expected to occur from future herbicide application under the adaptive strategy.

Forest Plan Consistency The IPNF Forest Plan directs that management activities will not significantly impair long-term soil productivity or produce unacceptable levels of sedimentation resulting from soil erosion. The Plan further states that management activities will comply with state water quality standards, and that National Forest lands will be managed to maintain and improve fish habitat capacities. All alternatives would be consistent with the Forest Plan.

Table IV-3. Levels of Herbicide Toxic to Aquatic Organisms Other Than Fish

Herbicide	Test Species	Test Results
Picloram	*Daphnia magna*	48 hr LC50 is 76 mg/l
Picloram	Scuds (*Gammarus fasciatus*)	96 hr LC50 is 27 mg/l
Picloram	Scuds (*Gammarus pseudolimnaeus*)	96 hr LC50 is 16.5 mg/l
Picloram	Stonefly (*Pteronarcys californica*)	96 hr LC50 is 4.8 mg/l
2,4-D amine	*Daphnia magna*	48 hr LC50 is greater than 100 mg/l.
2,4-D amine	Seed shrimp (*Cypridopsis vidua)*	48 hr LC50 is 8 mg/l.
2,4-D amine	Scuds (*Gammarus fasciatus*)	96 hr LC50 is greater than 100 mg/l
2,4-D amine	Midges (*Chironomus plumosus*)	48 hr LC50 is greater than 100 mg/l
Glyphosate	Scuds (*Gammarus fasciatus*)	96 hr LC50 is greater than 43 mg/l
Dicamba	*Daphnia magna*	96 hr LC50 is greater than 100 mg/l
Dicamba	Sow bugs (*Asellus brevicaudus*)	96 hr LC50 is greater than 100 mg/l
Dicamba	Scuds (*Gammarus fasciatus*)	96 hr LC50 is greater than 100 mg/l
Dicamba	Shrimp (*Palaemonetes kadiasis)*	96 hr LC50 is 28 mg/l
Clopyralid	Ram's horn Snail (*Helisoma trivolvis*)	No mortality after 48 hours in a solution containing 1 mg/l
Clopyralid	Green Algae (*Selenastrum Capricornu-tum*)	96 hr LC50 is 61 mg/l
Clopyralid	Duck weed (*Lemna minor*)	No growth reduction at 2 mg/l after 21 days
Clopyralid	Daphnids (*Daphnia* sp.)	48 hr LC50 is 225 mg/l
Triclopyr	*Daphnia magna*	48 hr LC50 1,170 mg/l
Metsulfuron Methyl	*Daphnia magna*	48 hr LC50 is greater than 150 mg/l

Values provided on this table are taken from Mayer and Ellersieck 1986 (2,4-D, dicamba, and picloram), Dow Chemical Company 1986 and undated (clopyralid), USDA 1992 (triclopyr, metsulfuron methyl), USDA 1983 (glyphosate).

Wildlife

Threatened, Endangered and Sensitive Species

Alternative A: No Action The No Action Alternative would have no direct impact on threatened, endangered or sensitive wildlife species. Noxious weeds would continue to spread at current or accelerated rates.

As noted in the discussion on Vegetative Community Diversity, untreated weeds can effectively displace native herbaceous vegetation, including preferred forage species. As native plant species are displaced by expanding weed populations, long-term habitat quality would diminish.

Herbivorous species, such as deer and elk, could be affected by a reduction in foraging habitat. This loss in foraging habitat could also indirectly affect those animals, such as the gray wolf, which depend on deer and elk as a food source. A decrease in deer and elk numbers would probably not be of a magnitude to impact current numbers of wolf (the gray wolf is viewed as a transient or infrequent visitor to the area). However, this reduction could affect future opportunities for their expansion and recovery in the area.

Woodland caribou would not be affected by the spread of noxious weeds because their food habits would not be impacted by noxious weeds. Their winter diet consists almost exclusively of boreal lichens, whereas during the remainder of the year they feed extensively on shrubs.

There would also be no effect on bald eagles and peregrine falcons from displaced native vegetation by weeds.

A reduction of succulent forage in grizzly bear habitat could occur if sites were overrun by noxious weeds. It has been noted by Jonkel (Cook 1991) that knapweed outcompetes native plants on which grizzly bears depend. Thus, the ability of the land to support grizzly bears would decline if weed populations are allowed to expand unchecked.

Sensitive wildlife tied to habitat features that are not influenced by noxious weed contamination would not be impacted. Such species include the black-backed woodpecker, flammulated owl boreal owl, common loon, Coeur d'Alene salamander, harlequin duck, northern bog lemming and Townsend's big-eared bat. The black-backed woodpecker, flammulated owl and boreal owl depend more on forest structure (i.e snags) than on ground vegetation. The common loon, Coeur d'Alene salamander, harlequin duck and northern bog lemming are associated with aquatic environments where there are no current noxious weed threats to their habitat. Potential future impacts to these species could occur if their habitat is infested with purple loosestrife, which has been reported on the district. The Townsend's big-eared bat is limited within the project area by the lack of suitable habitat such as caves and abandoned mine adits.

The wolverine could be indirectly affected by noxious weed spread in much the same way as the gray wolf. Noxious weed spread can also impact herbivore prey for other carnivores. However, the fisher and lynx would not be impacted; they and their prey are associated with habitats that are less susceptible to noxious weed invasion (moist, dense-canopied forests). The majority of weed infestations on the district are associated with drier, open-canopy habitats.

Other MIS

White-tailed deer and elk populations would be most affected by implementation of Alternative A. Available forage would likely be displaced by encroaching noxious weeds, reducing the biotic potential of the land to support these species.

The effects of noxious weeds on the pileated woodpecker and goshawk would be similar to those described for the black-backed woodpecker, flammulated owl and boreal owl. These species are most dependent upon older forest structure rather than ground vegetation.

The effects of noxious weeds on marten would be similar to those described for fisher and lynx. Marten and its prey are associated with habitats that are less susceptible to noxious weed invasion (moist, dense-canopied forests).

Other Species of Concern

Impacts to other species such as forest landbirds would vary depending on their habitat needs. In general, bird species that eat insects or seeds would be most affected by the spread of noxious weeds that cause a reduction in native vegetation and subsequent food supply. The least impacted birds would be those that are tied to habitat features that are not strongly influenced by noxious weed contamination (i.e. forest structure, undisturbed moist forest conditions).

Alternative B: Mechanical, Cultural and Biological Control Alternative B would continue to allow the spread of many weed species, as noted above in Existing Weed Infestations. Most infestations would not be brought under control. With the expected reduction in native plant diversity at many sites, impacts to wildlife species would be similar to those of Alternative A, although it may take longer for the effects to become noticeable.

Alternative C: Mechanical, Cultural, Biological and Chemical Control The discussion of effects for this alternative is limited to the effects of herbicide treatment. The direct effects of cultural, mechanical and biological treatments would be the same as under Alternative B.

Threatened, Endangered and Sensitive Species

None of the herbicides proposed for use bioaccumulate in wildlife in concentrations greater than their general environmental concentrations. Inferences of possible effects can be made by comparing the exposure levels wildlife would experience with the concentrations that elicit responses in wildlife. As discussed in the Human Health Risk Assessment for Herbicide Application to Control Noxious Weeds and Poisonous Plants in the Northern Region (Monnig 1988), immediately following an application of 1 pound of herbicide per acre, the herbicide concentration on grasses and small forbs would be about 125 parts per million (ppm). Within 90 days, the concentration of picloram on vegetation would be about 25 parts per million (Watson et al. 1989). The concentrations of 2,4-D amine, dicamba and clopyralid would likely be less than that of picloram because of their faster break-down rates.

The avian toxicity of herbicides proposed for use is extremely low (USDA Forest Service 1984). The picloram LC50 for mallard ducks and quail is in excess of 10,000 parts per million, which was the highest dose tested. Comparable values for the highest dose tested of clopyralid are 4,640 ppm; for dicamba in excess of 10,000 ppm; and for 2,4-D amine in excess of 5,000 ppm.

Feeding studies on grazing animals confirm the low toxicity of these herbicides. Deer that were fed foliage treated with 2,4-D at up to four times the rate proposed for this project showed no ill effects (Campbell et al. 1981). Cattle fed picloram-treated hay with concentrations 20 or more times greater than those expected on the proposed sites suffered no lethal effects (Monnig 1988). Heifers given dicamba at 20,000 ppm in feed showed no ill effects (Edson and Sanderson 1965). Clopyralid feeding studies with grazing animals are not available but would likely be similar to picloram, which is close to clopyralid's chemical analogue.

Comparisons of expected environmental concentrations with the toxicity levels of these herbicides indicates that negative impacts on birds, rodents and grazing animals are not expected. In addition, the evidence reviewed in the Human Health Risk Assessment indicates that these herbicides are quickly excreted by animals. Thus, impacts on predators such as wolves or raptors are not expected. Because these herbicides do not bioaccumulate, no cumulative impacts from herbicide application as proposed would be expected to occur.

Alternative C has the highest predicted effective-ness at controlling weeds, thereby preserving native plant community diversity. Inclusion of herbicide use would therefore increase the overall benefit of weed control efforts to wildlife habitat.

Forest Plan Consistency The IPNF Forest Plan directs that sensitive species be managed to prevent further declines which could lead to federal listing under the Endangered Species Act, and that management activities contribute to the conservation and recovery of threatened and endangered species. For other species, the Forest Plan directs that habitat will be managed to maintain viable populations. All alternatives would meet that direction.

Human Resources and Human Health

Alternative A: No Action The spread of noxious weeds within the National Forest is likely to have little impact on human health and safety. Human reactions range from allergic reaction to skin irritation and, as in the case of leafy spurge, the possibility of blindness (Callihan et al. 1991). It should also be noted that while the potential does exist for severe reactions, the probability of their occurrence is very low.

Alternative B: Mechanical, Cultural and Biological Treatment Impacts to human health and safety from mechanical and cultural treatment are likely to be minor. Possible effects include cuts, burns, allergies and skin irritation to the individuals performing the work. Skin irritations may result from a reaction to the sap of various noxious weeds, such as knapweed, or to the physical parts of the plant itself, such as spines in the thistles. Gloves, long-sleeved shirts and boots would be required for mechanical treatment and would minimize the risk of injuries or irritations.

Due to the nature of the worksites, injuries such as sprains or strains from repeated bending or working on uneven ground surfaces may result. Cumulative effects to human health would be insignificant because risks associated with weed treatment under this alternative would be similar to those of other forest activities.

The release of biological control agents for different species of noxious weeds would pose no threat to human health or safety, other than that associated with working on uneven ground surfaces.

Alternative C: Mechanical, Cultural, Biological and Chemical Treatment Impacts on human health from mechanical, cultural, and biological treatments would be the same as those disclosed under Alternative B.

Treatment with Herbicides

There is a wide variety of opinions within the general population on the value and safety of pesticides, including the herbicides proposed for use. Many people, particularly in rural and agricultural settings, view pesticides as a necessary part of business and, if used properly, a relatively safe tool. However, the risks of pesticide use are being questioned for many reasons.

The Northern Region of the Forest Service (Region 1) has analyzed the risk of the use of clopyralid, 2,4-D, dicamba, glyphosate, metsulfuron methyl, triclopyr and picloram to control noxious weeds. This analysis is presented in two documents: Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4, and 10 on Bonneville Power Administration Sites (USDA Forest Service 1992), and Human Health Risk Assessment for Herbicide Application to Control Noxious Weeds and Poisonous Plants in the Northern Region (Monnig 1988).

Analysis of the human health risk from pesticide use follows the same basic format as outlined under the section for aquatics. Toxicity information for the herbicides of interest is reviewed to determine the levels of these chemicals that would be harmful to human health. Exposures and doses that might occur as a result of these projects are then estimated for workers and members of the general public. The toxic effect levels established are compared to predicted dose levels to determine the possibility of health impacts.

A considerable body of data from tests on laboratory animals is available for these herbicides. Most of these tests have been conducted as a requirement for EPA registration of these compounds for use in the United States. It should be noted that none of these compounds have completed all tests required for final registration. Current Federal regulations allow for conditional registration pending the completion of all tests as long as no unreasonable adverse effects are found in the interim. This allowance for continued use before all testing is completed concerns some members of the public and has led to charges that "untested" pesticides are allowed on the market. All of the herbicides proposed for use within this document are EPA approved for use according to their labeled instructions, are *conditionally* registered, and have been assigned EPA registration numbers.

All of the herbicides proposed for use have been subjected to long-term feeding studies that test for general systemic effects such as kidney and liver damage. In addition, tests of the effects on reproductive systems, mutagenicity (birth defects), and carcinogenicity (cancer) have been conducted. No-observable-effect levels (NOEL) are available for most types of tests.

Extrapolating a NOEL from an animal study to humans is an uncertain process. The EPA compensates for this uncertainty by dividing NOELs from animal tests by a safety factor (typically 100) when deciding how much pesticide will be allowed on various foods. This adjusted dose level is referred to as the Acceptable Daily Intake (ADI) and is presumed by the EPA to be a dose that is safe even if received every day for a lifetime. This value is usually expressed as milligrams of herbicide allowed per kilogram of body weight (mg/kg). Table IV-4 displays the ADIs for the herbicides proposed for treatment.

Potential effects of herbicide treatment on human health were evaluated in three ways. Direct effects are those which may occur from direct contact with a herbicide, such as when a licensed applicator sprays an herbicide. Indirect effects are those which may occur from secondary contact with an herbicide, such as when people pick berries in an area where herbicide was absorbed by the berry plant from the soil. Cumulative effects are those which may occur in combination with other effects or have an increased effect over time, such as continued exposure to herbicides.

Table IV-4. Acceptable Daily Intake (ADI) mg/kg/day

Herbicide	ADI
Picloram	0.07
2,4-D	0.01 (0.3)*
Glyphosate	0.1
Dicamba	0.03
Clopyralid	0.5
Triclopyr	0.025
Metsulfuron Methyl	0.25

Notes: Values for ADI taken from USDA Forest Service (1992). The values are established by the EPA and are listed for all of the chemicals of concern. *For 2,4-D the World Health Organization has established an ADI of 0.3.

Direct Effects

Worker doses vary depending on several factors. The conditions under which a given herbicide is applied will affect the level of exposure. Higher winds create more drift, especially when a high-pressure nozzle is used which increases the chance of vapors. Using appropriate personal protective equipment (PPE) as required can lower the exposure for workers by as much as 68% (USDA Forest Service 1992). The use of PPE is critical, as most application exposure to herbicides is through the skin rather than through the lungs (Monnig 1988). Finally, the attention and care given by a worker mixing, loading or applying herbicides greatly influences the risk of exposure. Proper training and certification for the mixing, loading, and application of herbicides is essential to reduce the risks.

The one-day dose for workers applying 2,4-D with a backpack sprayer could exceed the EPA's recommended daily dose. However, the risks would be very small because the spraying would only take place a few weeks per year and the ADI assumes a lifetime of daily doses. Furthermore, use of design criteria (Chapter II) and herbicide application guidelines (Appendix D) during project implementation would reduce the incidence of worker exposure to herbicides.

There is the possibility of hypersensitivity in a small percentage of the population. These persons are generally aware of their sensitivities since they are typically triggered by a variety of natural and synthetic compounds. Such persons would not be permitted to work on the spray crews.

Indirect Effects

Indirect effects could result from people entering a previously treated area and being exposed to herbicide residues. Concerns are raised about the possibility of consuming wild foods such as berries or mushrooms after herbicide treatment has occurred. The

potential for an individual to consume wild foods that have been treated is low. Most spraying would occur along road rights-of-way where the occurrence of wild foods is low. Occasionally, a spray swath may overlap with huckleberries and the berries may be sprayed. Within a few days of treatment the huckleberry plants would turn brown and lose their fruit. However, berries could be picked and consumed before they drop off.

To determine the dose for consumption of huckleberries that might be accidentally sprayed with herbicide, the USDA Forest Service Risk Assessment's (1992) methodology was used. Oral consumption of 2,4-D was used to analyze the concentration in the berries and the dose received by a person consuming sprayed berries. The analysis used 2,4-D because it would have the highest concentration based on its application rate.

Based on this methodology, if huckleberry plants occurred on the edge of the spray zone and received spray drift, a 150-pound person would have to consume 210 pounds of huckleberries each day for a lifetime to reach the EPA's acceptable daily intake (ADI) for 2,4-D. In a worst-case scenario, if huckleberry plants were directly sprayed, a 150-pound person would have to consume a half pound of huckleberries each day for a lifetime in order to reach the EPA's ADI for 2,4-D. The likelihood of a person reaching the ADI of 2,4-D is extremely low for several reasons. First, the probability of a large amount of huckleberries being sprayed in a road right-of-way is low. Second, the chance of a person picking huckleberries in a road right-of-way where weeds are occurring (cutbanks and fill slopes) is low. Third, the probability of a person picking and consuming even as little as a half pound of huckleberries every day of their life is extremely low. Fourth, the time period between when the plants are sprayed and berries dry up is generally less than a week, which reduces the chance those berries will be picked. Lastly, signing of the sprayed areas (see Chapter II) would discourage berry-picking at those sites.

Similarly, the risk of exposure to people hiking through a recently sprayed area would be low (USDA Forest Service 1992 and Monnig 1988). The main route of ingestion of herbicide would be through the skin. If a hiker did walk through an area just sprayed with 2,4-D, the dose received would be 40 times lower than the ADI established by the EPA. Mullison (1985) concludes that, based upon several studies, picloram is not likely to cause skin irritation. For people picking berries in a recently sprayed area, the dose of picloram received in one hour would be 37 times lower than the ADI established by the EPA.

Cumulative Effects

Cumulative effects would apply both to workers and to the public, who may experience continued exposure to herbicides. The ADI used for analysis is based on the level of herbicide that would be acceptable each day for a lifetime. Over time, a person may be exposed to some quantity of herbicide, but since spraying would occur only a few weeks each year the daily intake over a lifetime would not approach the EPA's standard.

The issue of delayed effects of low levels of chemical exposure is raised by some people. Principal among these effects is cancer. All of these herbicides have been tested for carcinogenicity. The evidence for cancer initiation or promotion from 2,4-D and picloram has been widely debated. Current evidence is mixed, and these compounds seem, at most, weakly carcinogenic. The project file contains a summary of a report from the EPA's Science Advisory Board Joint Committee regarding potential carcinogenicity of 2,4-D. The report recognizes that 2,4-D may be a carcinogen. However, the committee concluded that current research cannot distinguish whether observed risks are due to the use of 2,4-D or to daily exposure to other substances. Also included in the project file is a letter from Dr. John Graham of the Harvard University School of Public Health

summarizing the current evidence on 2,4-D. As noted in the letter, the weight of evidence that 2,4-D is a carcinogen is not strong, and even if it is ultimately shown to be an animal carcinogen, it is unlikely to be very potent.

Nonetheless, the Risk Assessments cited above assume that the two herbicides are carcinogens. Those analyses also assume that any dose of a carcinogen could cause cancer and that the probability of cancer increases with increasing doses. Estimations of the probability of developing cancer from exposure to these compounds are based on a conservative extrapolation from cancer rates in animals subjected to a given chemical over a lifetime.

The risks are relatively low compared to other commonly encountered risks. For example, there is an increased risk of cancer accumulated from living in Denver, Colorado, at a high elevation for 1.5 months compared to living at sea level, because of cosmic rays. Smoking two cigarettes increases the risk of cancer by one in a million.

Projected cancer rates are highest for workers since their doses are highest. Cancer probabilities of workers would increase by about one in a million after spraying 2,4-D for 193 days or spraying picloram for about 17,000 days. (Monnig 1988). These numbers were derived using a worst-case scenario of a high dose of herbicide with a low amount of worker protection. Given the requirements for worker protection outlined in Appendix E the cumulative impact from spraying at the rates proposed would be insignificant.

Concerns are occasionally raised about the cumulative and synergistic interactions of the pesticides and other chemicals in the environment. Synergism is a special type of interaction in which the cumulative impact of two or more chemicals is greater than the impact predicted by adding their individual effects. The Risk Assessments referenced above address the possibility of a variety of such interactions. These include the interaction of the active ingredients in a pesticide formulation with its inert ingredients; the interactions of these chemicals with other chemicals in the environment; and the cumulative impacts of herbicide treatment as proposed and other herbicide use which the public might be exposed to.

We cannot absolutely guarantee the absence of a synergistic interaction between the herbicides proposed for use and other chemicals to which workers or the public might be exposed. It is possible, for example, that exposure to benzene (a known carcinogen that comprises one to five percent of automobile fuel exhaust) followed by exposure to any of these herbicides could result in unexpected biochemical interactions. Testing the virtually infinite number of chemical combinations would be impossible.

There are a number of reasons to expect that synergistic or other unusual cumulative interactions would be rare. Mullison (1985), Monnig (1988), USDA Forest Service Risk Assessment (1992), and EPA (1994) refer to low teratogenic, mutagenic and carcinogenic properties of herbicides compared to naturally occurring chemicals in foods. The low, short-lived doses that would result from spraying these herbicides are very small compared to many other chemicals in the environment. The EPA states in a discussion entitled Guidelines for the Health Risk Assessment of Chemicals (Federal Register September 24, 1986) that, for these relatively small doses, a synergistic effect is not expected. They suggest in their discussion of interactions (synergistic or antagonistic effects), "there seems to be consensus that for public health concerns regarding causative (toxic) agents, the additive model is more appropriate [than any multiplicative model]".

There have been some recent concerns regarding this claim. Arnold et al. (1996) discuss their findings of higher than expected synergistic effects of four pesticides (three of these four pesticides have been banned in the U.S.). In discussing this new study, Kaiser (1996) describes how the findings may cause need to revise current assumptions concerning

synergism. Kaiser also cites that more work needs to be done to determine any relevance to humans and that currently there are more questions than answers concerning the new findings. While this one study does show the possibility of increased risk, there is not yet sufficient scientific research to conclude that the chemicals being proposed for use would exhibit the same results as found in the Arnold study. Based on the best scientific information available, we would reasonably expect that human health impacts from herbicide applications on the proposed sites would be insignificant.

Forest Plan Consistency All alternatives would be consistent with the IPNF Forest Plan with regard to Human Resources and Human Health.

Probable Environmental Effects That Cannot Be Avoided

The application of herbicides brings with it the likelihood of some environmental impacts that cannot be avoided. These have been discussed above and would primarily involve non-target plants. Although it is possible that minute amounts of herbicide would migrate from treatment sites, alternative design criteria would prevent environmentally significant concentrations of herbicide from reaching surface or groundwater. Thus, under reasonably foreseeable circumstances, there would be no significant environmental effects.

The adoption of the No Action Alternative or any of the non-chemical alternatives would not immediately result in unavoidable environmental impacts. However, it is clear that alternatives which allow the continued spread of noxious weeds would eventually result in unavoidable environmental effects. Weed species that are considered naturalized in an area are very difficult to control. A visible example is the level of spotted knapweed infestation in many areas of northern Idaho. Although spotted knapweed is generally considered to be naturalized in many locations, there are still areas that are relatively uninfested by this weed. Successful eradication of small populations of this species, and reduction of seed production in large populations, would slow its rate of spread and reduce its occurrence relative to other, more desired species. But when infestation levels increase to the point that it is not practical or economically feasible to control them, adverse environmental impacts are unavoidable.

Possible Conflicts With Planning and Policies of Other Jurisdictions

The Idaho noxious weeds laws direct the County control authorities to make all reasonable efforts to develop and implement a noxious weed program. The lack of weed control under the No Action Alternative would conflict with these State and County weed control plans and policies. Alternatives B and C would indicate that the Forest Service is committed to the management of noxious and undesirable weeds in Sandpoint Ranger District.

None of the alternatives would conflict with State and Federal water or air quality regulations or with U.S. Fish and Wildlife Service recovery plans for threatened and endangered species. A biological assessment of potential effects of the preferred alternative to threatened and endangered species will be completed for the FEIS.

Irreversible and Irretrievable Commitment of Resources

Both action alternatives would involve an irretrievable commitment of labor, fossil fuels, and economic resources.

APPENDIX A - List of Preparers

Name	Title	Responsibility and Expertise
Anna E. (Betsy) Hammet	North Zone Botany Coordinator	Project Team Leader, Noxious Weed Coordinator, Vegetation analysis
Gary Harris	Hydrology Technician	Aquatics analysis
David Roberts	Wildlife Biologist	Wildlife analysis
Judy York	Writer/Editor	NEPA compliance, public involvement, document preparation

The following individuals provided additional support and expertise to the analysis:

Name	Expertise	Contribution
Suzanne Audet	Threatened and Endangered Wildlife Species	US Fish and Wildlife Service review of document
Matt Butler	Noxious weed control, herbicide application	Recommendations for noxious weed control, guidance for herbicide use
Tony Erba	NEPA compliance	Guidance on NEPA process, document review
Mary Ann Hamilton	Recreation	Identification of high use trailheads and dispersed sites prone to weed infestations
Robert Klarich	Noxious weed Control, licensed applicator	Weed surveys, recommendations for control
Kevin Naffin	Noxious weed control, Certified herbicide applicator	Document review, guidance for herbicide use
Doug Woodfill	Environmental Protection Agency	Document review, guidance for herbicide use

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APPENDIX C - Herbicide Descriptions

Additional information on the herbicides discussed below can be found in the project file.

2,4-D amine is a herbicide with very little persistence in the environment. 2,4-D has several formulations; some of the common brand names include Weed-B-Gon, HiDep and Solution. This herbicide has low toxicity to aquatic species, and several formulations are approved for use in water and near water. At application rates of one to 1.5 pounds per acre, 2,4-D exhibits good control of knapweed with repeat applications and moderate control of goatweed, houndstongue, sulfur cinquefoil, and Canada thistle.

Clopyralid is a relatively new herbicide that is very selective and is toxic to some members of only three plant families: the composites (Compositae), the legumes (Fabaceae), and the buckwheats (Polygonaceae). Clopyralid is the active ingredient in Transline, and is one of two active ingredients in Curtail (the other being 2,4-D). At application rates of one-quarter to one-half pound per acre, clopyralid is very effective against knapweed, the hawkweeds, and Canada thistle. However, it does not control any of the other weed species of concern. Clopyralid is more persistent than 2,4-D and dicamba, but less persistent than picloram.

The selective nature of clopyralid makes it an attractive alternative on sites with non-target species that are sensitive to the other herbicides. Clopyralid has soil-mobility characteristics comparable to picloram, so the possibility of groundwater impacts must be addressed.

Dicamba (the active ingredient in Banville) is a broad-leaf herbicide that is readily absorbed by leaves and roots and is concentrated in the metabolically active parts of plants. Dicamba is effective against a similar range of weed species as 2,4-D at similar application rates. Dicamba is somewhat more persistent than 2,4-D and therefore provides somewhat longer control of susceptible species.

Glyphosate[1] is a non-selective, broad-spectrum herbicide that is absorbed by leaves and translocated throughout the plant. Glyphosate has little soil activity, and its absorption by roots is minimal to non-existent. Due to its non-selectivity, glyphosate tends to eliminate both desirable and undesirable vegetation. Even if desirable vegetation is reseeded, hawkweed and other noxious weeds maintain their competitive advantage. A certain degree of selectivity can be achieved through method of application (using a wick applicator to "paint" the herbicide on the target plant, thus avoiding desired vegetation). Glyphosate has merit for use where low soil mobility and short-term persistence are required to alleviate environmental concerns.

Metsulfuron methyl is used for control of annual and perennial broad-leaf weeds. Control areas include rights-of-way on roadsides and powerlines. The most commonly used formulation is Escort. Metsulfuron methyl can be mixed with other chemicals to provide more effective control. Metsulfuron methyl is broken down in soil by the action of microorganisms and by the chemical action of water.

Picloram (the active ingredient in Tordon 22K) controls a variety of broad-leaved weed species, including all of the weed species of concern. Picloram is generally applied at rates of one-quarter to one-half pound per acre. However, picloram's combination of mobility and persistence have generated concern over possible groundwater contamination. Possible environmental impacts are compared between this method and the other chemical and non-chemical control methods.

[1] Although glyphosate is not proposed to be used for the 46 treatment sites, it may be used on new sites in the future.

Triclopyr[2] is a selective herbicide used in a variety of vegetation management situations such as controlling weeds or controlling vegetation in powerline, railroad, pipeline, and road rights-of-way. It is the active ingredient in Garlon 4, an effective herbicide used to control brush in combination with foliar, basal bark, and cut-stump treatments. It is often mixed with other chemicals at varying rates to improve effectiveness and reduce the amount of herbicide applied. Triclopyr degrades rapidly in soil and water.

[2] Although triclopyr is not proposed to be used for the 46 treatment sites, it may be used on new sites in the future.

APPENDIX D - Herbicide Application Guidelines

General Application

- Apply herbicide only when wind speeds are less than 8 miles per hour.
- Do not apply herbicide if precipitation is expected within 4 to 6 hours.
- All herbicide application will be performed or supervised by a state licensed applicator.
- Post all treatment areas of special public concern with signs prior to treatment and immediately following treatment. Such areas include mushroom and huckleberry picking areas, trailheads, campsites, and other high use areas.
- Do not use picloram where there are coarse, sandy soils.

Riparian and Wetland Habitats (areas within 150 feet of surface water)

- Do not apply herbicide within 10 feet of live water.
- Use only hand spray with power equipment.
- Do not use picloram or clopyralid. Depending on site conditions, glyphosate or 2,4-D are preferred herbicides.
- Apply herbicide only when wind speeds are less than 5 miles per hour.

Floodplains (areas within 50 feet of ***live*** water)

- Use only manual control or hand spray of herbicides.
- Apply herbicide only when wind speeds are less than 8 miles per hour.
- Do not apply herbicide within 10 feet of live water.
- Do not use picloram or clopyralid. Depending on site conditions, glyphosate or 2,4-D are preferred.

Identified Sensitive Plant Locations

- Do not use vehicle-based herbicide application within 50 feet from known sensitive plant locations. Manual control or hand spray are preferred methods.
- Apply herbicide only when wind speeds are less than 5 miles per hour.
- Do not use picloram or 2,4-D (alone). Depending on conditions, clopyralid or clopyralid combined with 2,4-D are preferred.

Conifer Plantations

- Use manual control, hand spray of herbicides or hand spray with power equipment. Do not use power boom equipment.
- Do not use picloram. Depending on conditions, clopyralid or clopyralid combined with 2,4-D are preferred.
- Apply herbicide only when wind speeds are less than 5 miles per hour.

APPENDIX E - Handling Of Herbicides

In Case of Spills

The following equipment will be available with vehicles or pack animals used to transport pesticides and in the immediate vicinity of all spray operations.

- A shovel
- A broom
- 10 pounds of absorbent material or the equivalent in absorbent pillows
- A box of large plastic garbage bags
- Rubber gloves
- Safety goggles
- Protective overalls
- Rubber boots

The following information will be reviewed with all personnel involved in the handling of pesticides:

- Applicable Material Safety Data Sheets (MSDS) .
- From the EPA guide *Applying Pesticides Correctly: A Guide for Private and Commercial Applicators*, the section entitled "Clean Up of Pesticide Spills" (see project file).
- From the *Northern Region Emergency and Disaster Plan* the section entitled "Hazardous Materials Releases and Oil Spills" (see project file).

Procedures For Mixing, Loading and Disposal of Herbicides

1. All mixing of herbicieds will occur at least 100 feet from surface waters or well heads.

2. Dilution water will be added to the spray container prior to addition of the spray concentrate.

3. All hoses used to add dilution water to spray containers will be equipped with a device to prevent back-siphoning.

4. Applicators will mix only those quantities of herbicides that can be reasonably used in a day.

5. During mixing, mixers will wear a hard hat, goggles or face shield, rubber golves, rubber boots, and protective overalls.

6. All empty containers will be triple rinsed and rinsate disposed of by spraying near the application site at rates that do not exceed those on the spray site.

7. All unused herbicide will be stored in a locked building in accordance with herbicide storage regulations contained in Forest Service Handbook 2109.13.

8. All empty and rinsed pesticide containers will be punctured and either burned or disposed of in a sanitary landfill.

APPENDIX F - Cost Estimates of Alternatives

Alternative B, 1st Year

Mechanical Control

Hand Control	63.09 acres @ 0.1 acres/person/day x $120/day (30 people for 21 days)	=	$ 75,708
Mowing	10.0 acres @ $25/hour x 1 acre/hour	=	$ 250
	Total	=	**$ 75,958**

Cultural Control

Planting	101.83 treatment acres averaging 30 trees/acre--interplanting planting costs are $504 per 1,000 trees	=	$ 1,540
	3,055 trees @ $240 per 1,000 trees	=	733
	Total	=	**$ 2,273**

Note: No cultural control is anticipated for the 2nd and 3rd years

Biological Control

Total treatment acres = 999.95

Goatweed	=	$ 47,608
Spotted Knapweed	=	31,427
Total	=	**$ 79,035**

1st Year Total Control Costs Alternative B **$157,266**

Alternative B, 2nd Year

Mechanical Control

Hand Control	56.78 acres @ 0.1 acres/person/day x $124.80/day (30 people for 19 days)	=	$70,861

(Assumes 10% control and 63.09 acres treated in year 1, and a 4% increase in cost)

Mowing	10.0 acres @ $25/hour x 1 acre/hour	=	$ 250
	Total	=	**$71,111**

Biological Control

Total treatment acres = 999.95 (Same as year 1)	
Goatweed	= $47,608
Spotted Knapweed	= 31,427
Total	**= $79,035**
2nd Year Total Control Costs Alternative B	**$150,146**

Alternative B, 3rd Year

Mechanical Control

Hand Control	51.02 acres @ 0.1 acres/person/day x $129.79/day (30 people for 17 days)	= $66,219

(Assumes 10% control and 56.78 acres treated in year 2, and a 4% increase in cost)

Mowing	10.0 acres @ $25/hour x 1 acre/hour	= $ 250
	Total	**= $ 66,469**

Biological Control

Total treatment acres = 499.98 (50% of year 1)	
Goatweed	= $ 23,804
Spotted Knapweed	= 15,714
Total	**= $ 39,518**
3rd Year Total Control Costs Alternative B	**= $105,985**

Alternative C, 1st Year

Mechanical Control

Hand Control	10.2 acres @ 0.1 acres/person/day x $120/day (6 people for 17 days	= $12,240
Mowing	10.0 acres @ $25/hour x 1 acre/hour	= $ 250
	Total	**= $12,490**

Cultural Control

Planting	101.83 treatment acres averaging 30 trees/acre interplanting--planting costs are $504 per 1,000 trees	= $ 1,540
	3,055 trees @ $240 per 1,000 trees	= 733
	Total	**= $ 2,273**

Note: No cultural control is anticipated for the 2nd and 3rd years

Biological Control

Total treatment acres = 943

Goatweed	= $ 44,905
Spotted Knapweed	= 29,637
Total	**= $ 74,542**

Chemical Control

Dicamba	0.10 acre @ $ 5.43/acre	= .54
Dicamba + 2,4-D	0.25 acre @ $ 8.33/acre	= 2.08
Clopyralid + 2,4-D	8.48 acres @$17.50/acre	= 148.40
Metsulfuron methyl (includes metsulfuron methyl/picloram and metsulfuron methyl/2,4-D)	104.39 acres @ $35.20/acre	=3,674.53
Clopyralid (includes Clopyralid/picloram and Clopyralid/metsulfuron methyl)	6.46 acres @ $38.83/acre	= 250.84
2,4-D	0.04 acre @ $ 8.55/acre	= .34
Picloram	0.60 acre @ $27.20/acre	= 16.32
Total Acres treated	= 120.32	**$4,093.05**
Labor	120.32 acres @ $33.33/acre	4,010.27
	Total Chemical Control	**$8,103.00**

1st Year Total Control Costs Alternative C **$95,385.00**

Alternative C, 2nd Year

Mechanical Control

Hand Control	7.14 acres @ 0.1 acres/person/day x $124.80/day (6 people for 12 days)	= $ 8,911

(Assumes 30% control and 10.2 acres treated in year 1, and a 4% increase in cost)

Mowing	10.0 acres @ $25/hour x 1 acre/hour	= $ 250
	Total	**$ 9,161**

Biological Control

Total treatment acres = 943 (Same as year 1)

Goatweed	=	$ 44,905
Spotted Knapweed	=	29,637
Total		**$ 74,542**

Chemical Control
(Assumes 70% control in year 1)

Dicamba	0.03 acre @ $ 5.43/acre	=	.16
Dicamba + 2,4-D	0.08 acre @ $ 8.33/acre	=	.62
Clopyralid + 2,4-D	2.54 acres @$17.50/acre	=	44.52
Metsulfuron methyl (includes metsulfuron methyl/picloram and metsulfuron methyl/2,4-D)	31.30 acres @ $35.20/acre	=	1,102.36
Clopyralid (includes Clopyralid/picloram and Clopyralid/metsulfuron methyl)	1.94 acres @ $38.83/acre	=	75.25
2,4-D	0.01 acre @ $ 8.55/acre	=	.10
Picloram	0.18 acre @ $27.20/acre	=	4.90
Total Acres treated	= 36.08		**$1,227.91**
Labor (Assumes a 4% increase in cost)	36.08 acres @ $34.66/acre	=	1,250.53
	Total Chemical Control		**$ 2,478.00**
2nd Year Total Control Costs Alternative C			**$86,181.00**

Alternative C, 3rd Year

Mechanical Control

Hand Control	5.00 acres @ 0.1 acres/person/day x $129.79/day (5 people for 10 days)	= $ 6,490

(Assumes 30% control and 7.14 acres treated in year 1, and a 4% increase in cost)

Mowing	10.0 acres @ $25/hour x 1 acre/hour	= $ 250
	Total	**$ 6,740**

Biological Control

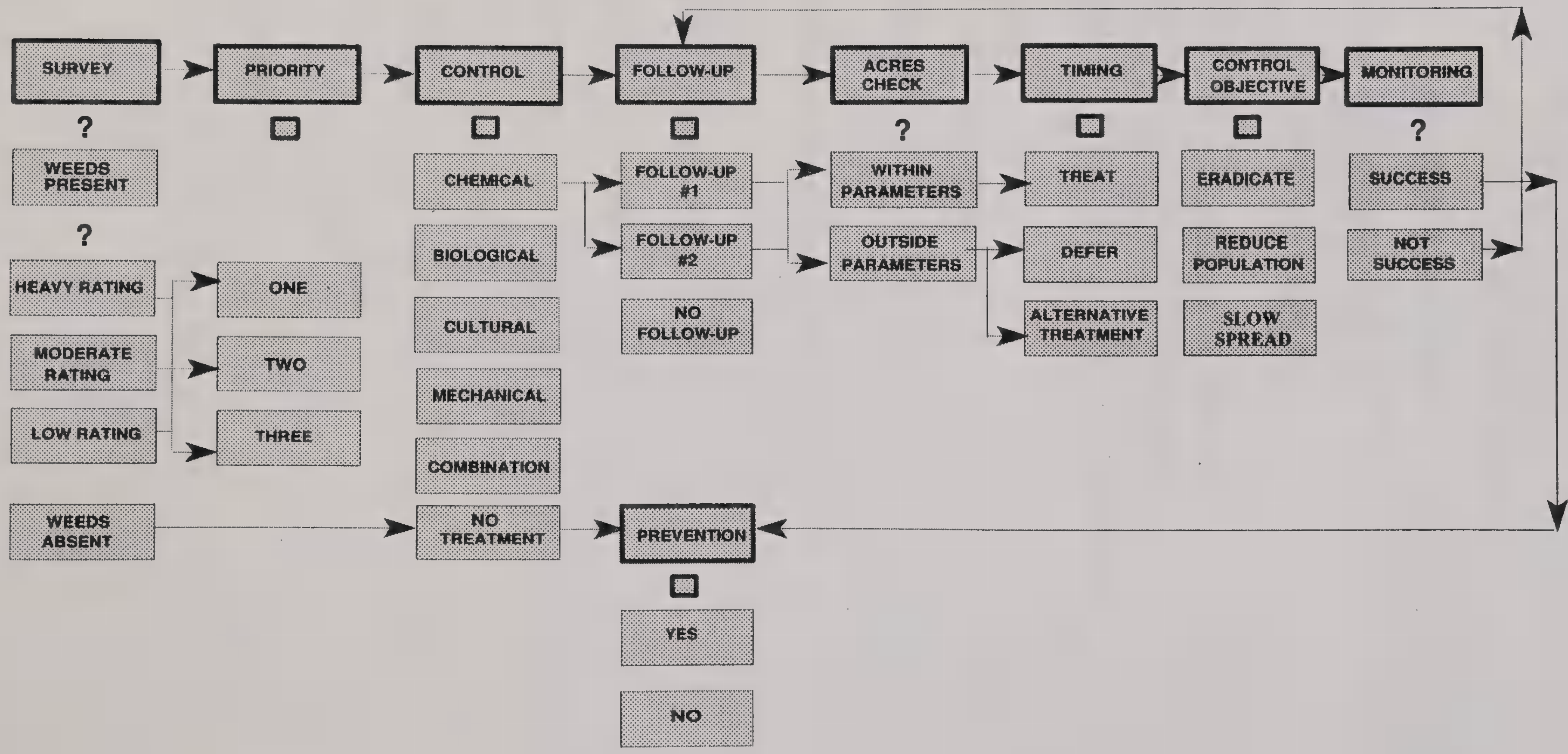
Total treatment acres = 471.5 (50% of year 1)

Goatweed	=	$ 22,453
Spotted Knapweed	=	14,819
Total		**$ 37,271**

Chemical Control
(Assumes 50% control in year 2)

Dicamba	0.01 acre @ $ 5.43/acre	= .11
Dicamba + 2,4-D	0.04 acre @ $ 8.33/acre	= .33
Clopyralid + 2,4-D	1.27 acres @$17.50/acre	= 22.23
Metsulfuron methyl (includes metsulfuron methyl/picloram and metsulfuron methyl/2,4-D)	15.65 acres @ $35.20/acre	= 550.88
Clopyralid (includes Clopyralid/picloram and Clopyralid/metsulfuron methyl)	0.97 acres @ $38.83/acre	= 37.67
2,4-D	0.005 acre@ $ 8.55/acre	= .04
Picloram	0.09 acre @ $27.20/acre	= 2.45
Total Acres treated	= 18.04	**$613.71**
Labor(Assumes a 4% increase in cost)	18.04 acres @ $36.05/acre	= 650.34
	Total Chemical Control	**$1,264.00**
3rd Year Total Control Costs Alternative C		**$45,275.00**

APPENDIX G -- Adaptive Strategy Flow Chart



? = QUESTION TO BE ANSWERED

▢ = DECISION TO BE MADE

THE ABOVE DECISION PROCESS WILL BE USED TO DETERMINE TREATMENT METHODS AND TIMING FOLLOWING NOXIOUS WEED SURVEYS FOR EACH SITE. ANY PROPOSED HERBICIDE TREATMENT ON A GIVEN SITE MUST BE EVALUATED TO DETERMINE IF ACRES PROPOSED FOR CHEMICAL APPLICATION FALL WITHIN THE PARAMETERS FOR MAXIMUM ACRES TREATED AS ESTABLISHED BY DISTRICT AQUATICS PERSONNEL. THE DETERMINATION MUST TAKE INTO ACCOUNT PROPOSED CHEMICAL APPLICATION AS FOLLOW-UP TREATMENT ON PREVIOUSLY TREATED SITES WITHIN THE SAME DRAINAGE AREA.

MEASURE OF SUCCESS WILL BE BASED ON OBJECTIVE OF WEED TREATMENT (ERADICATION OR POPULATION REDUCTION), INFESTATION SIZE AND PERCENT OCCUPANCY OF TARGETED NOXIOUS WEED SPECIES AFTER TREATMENT.

APPENDIX H - Weed Species Characteristics

WEED SPECIES	FAMILY	PLACE OF ORIGIN	LIFE CYCLE	MODES OF REPRODUCTION	BIOCONTROL AGENTS	CHEMICAL AGENTS	CULTURAL METHODS	MECHANICAL METHODS
Goatweed	Clusiaceae	Southern Europe	Perennial	Seeds	Defoliating beetle	2,4-D	Revegetation for shade	Handpulling must remove all roots
(Hypericum perforatum)				New shoots from shallow	*(Chrysolina quadrigemina)*	metsulfuron methyl	Regular cultivation	
				radiating roots	Root Boring Beetle	picloram + 2,4-D		
					(Agrilus hyperici)			
					Leaf and flower moth			
					(Aplocera plagiata)			
Meadow hawkweed	Asteraceae	Northcentral Europe	Perennial	Seeds, stolons, rhizomes	None currently available	2,4-D + picloram	Revegetation for shade	Handpulling not recommended
(Hieraceum pratense)		Eastern Europe				glyphosate	Seeding + fertilization	(stimulates sprouting from rhizomes)
						clopyralid	Annual cultivation	Must remove all roots
						dicamba + 2,4-D		
Orange hawkweed	Asteraceae	Northcentral Europe	Perennial	Seeds, stolons, rhizomes	None currently available	2,4-D + picloram	Revegetation for shade	Handpulling not recommended
(Hieraceum aurantiacum)		Eastern Europe				glyphosate	Seeding + fertiliaztion	(stimulates sprouting from rhizomes)
						clopyralid		Must remove all roots
						dicamba + 2,4-D		
Houndstongue	Boraginaceae	Europe	Biennial	Abundant seed production	None currently available	picloram	None recommended	Handpulling before seed production
(Cynoglossum officinale)						metsulfuron methyl		Cutting plants at soil surface reduces
								seed production in regrowth
Diffuse knapweed	Asteraceae	Eurasia	Biennial or short-lived	Abundant seed production	Seed head gall fly	glyphosate	Revegetation for shade	Handpulling of small infestations
(Centaurea diffusa)			perennial		*(Urophora affinis)*	picloram	Spring burning	(usually takes 7-10 years)
					Seed head gall fly	2,4-D		
					(Urophora quadrifasciata)	clopyralid		
					Peacock fly	clopyralid + 2,4-D		
					(Chaetorellia acrolophi)	dicamba		

WEED SPECIES	FAMILY	PLACE OF ORIGIN	LIFE CYCLE	MODES OF REPRODUCTION	BIOCONTROL AGENTS	CHEMICAL AGENTS	CULTURAL METHODS	MECHANICAL METHODS
					Seed head weevil			
Diffuse knap-weed					*(Bangasternus fausti)*			
(cont.)					Root weevil			
					(Cyphocleonus achates)			
					Root moth			
					(Agapeta zoegana)			
Spotted knap-weed	Asteraceae	Eurasia	Biennial or short-lived	Seeds, lateral shoots	Seed head gall fly	glyphosate	Revegetation for shade	Handpulling of small in-festations
(Centaurea maculosa)			perennial		*(Urophora affinis)*	picloram	Regular cultivation/seeding	(usually takes 7-10 years)
					Seed head gall fly	2,4-D	Spring burning	
					(Urophora quadrifas-ciata)	clopyralid		
					Seed head moth	clopyralid + 2,4-D		
					(Metzneria paucipunctella)	dicamba		
					Black leaf blight fun-gus			
					(Alternaria alternata)			
					Root moth			
					(Agapeta zoegana)			
					Verdant seed flly			
					(Terellia virens)			
					Root weevil			
					(Cyphocleonus achates)			
Ox-eye daisy	Asteraceae	Eurasia	Perennial	Seeds, rhizomes	None currently avail-able	2,4-D	Revegetation for shade	Burning before flowering
(Chrysanthe-mum leucan-themum)						clopyralid		Handpulling not recom-mended
						clopyralid + 2,4-D		(regrowth from rhizomes)
								Regular cultivation
Purple loosestrife	Lythraceae	Europe, Asia	Perennial	Seeds, rhizomes	Black-margined beetle	glyphosate	Not recommended	Handpulling only small infestations
(Lythrum sali-caria)		North Africa			*(Galerucella call-mariensis)*			(must remove all roots)
					Golden beetle *(Galerucella pullisa)*			Cut below water 3 con-secutive years

WEED SPECIES	FAMILY	PLACE OF ORIGIN	LIFE CYCLE	MODES OF REPRODUCTION	BIOCONTROL AGENTS	CHEMICAL AGENTS	CULTURAL METHODS	MECHANICAL METHODS
Tansy ragwort	Asteraceae	Europe, Asia	Biennial or short-lived	Seeds, regrows from roots	Seed fly	2,4-D		Handpulling small infestations before
(Senecio jacobaea)			Perennial		*(Pegohyllemyia seneciella)*	picloram		flowering (must remove all roots)
					Flea beetle	dicamba		Mowing to reduce seed production
					(Longitarsus jacobaeae)	2,4-D + dicamba		Grazing with sheep
					Cinnabar moth *(Tyria jacobaeae)*	metsulfuron methyl		
Rush skeletonweed	Asteraceae	Eurasia, North Africa	Perennial	Seeds, lateral roots and	Gall midge	2,4-D	Cultivation not recommended	Hand pulling must remove all roots
(Chondrilla juncea)				root fragments	*(Cystiphora schmidti)*	picloram	(increases growth from roots)	(3-6 times per year for 6-10 years to
					Gall mite	clopyralid + dicamba	Seeding + fertilizing with nitrogen	eradicate new shoots & seedlings)
					(Eriophyes chondrillae)			Mowing not recommended
					Rush skeletonweed rust			
					(Puccinia chondrillina)			
Sulfur cinquefoil	Rosaceae	Eurasia	Perennial	Seeds	None currently available	2,4-D + dicamba	Regular cultivation and seeding	Handpulling of small infestations
(Potentilla recta)						picloram		(Must remove root crown)
						2,4-D		Mowing not recommended
Leafy spurge	Euphorbiaceae	Eurasia	Perennial	Seeds, spreading roots	Flea beetle	dicamba	Cultivation every 14 days	Mowing/cutting before flowering
(Euphorbia esula)					*(Aphthona abdominalis)*	picloram	Seeding w/ sod-forming perennials	Handpulling of small infestations
					Flea beetle	glyphosate	Fall burning	before seed production
					(Aphthona nigriscutis)	glyphosate + 2,4-D		Grazing with sheep or goats
					Hawk moth	picloram + 2,4-D		
					(Hyles euphorbiae)			
Yellow starthistle	Asteraceae	Southern Europe	Winter Annual	Seeds	Seed head weevil	picloram		Mowing, burning early in flower
(Centaurea solstitialis)			or Biennial		*(Bangasternus orientalis)*	clopyralid	(toxic to horses)	(timing is critical)

WEED SPECIES	FAMILY	PLACE OF ORIGIN	LIFE CYCLE	MODES OF REPRODUCTION	BIOCONTROL AGENTS	CHEMICAL AGENTS	CULTURAL METHODS	MECHANICAL METHODS
Yellow starthistle					Peacock fly	2,4-D amine + clopyralid	Revegetation for shade	(Hard to control seed bank
(cont.)					*(Chaetorellia australis)*			with mechanical methods)
					Flower weevil *(Larinus curtus)*			Grazing before spine production
					All have limited success			
Common tansy	Asteraceae	Europe	Perennial	Seeds, rhizomes	None currently available	dicamba + picloram	Revegetation for shade	Handpulling not recommended
(Tanacetum vulgare)						metsulfuron methyl		(stimulates sprouting from rhizomes)
							Regular cultivation	Must remove all roots
								Mowing to reduce seed production
Bull thistle	Asteraceae	Eurasia	Biennial	Seeds	Gall fly	picloram	Revegetation for shade	None recommended
(Cirsium vulgare)					*(Urophora stylata)*			
Canada thistle	Asteraceae	Eurasia	Perennial	Seeds, shoots from lateral	Stem-boring beetle	2,4-D	Revegetation for shade	Removing flowers to prevent
(Cirsium arvense)				roots	*(Ceutorhyncus litura)*	clopyralid + 2,4-D	Cultivation not recommended	seed production
					Gall fly	clopyralid		
					(Urophora cardui)	dicamba		
					Shoot fungus			
					(Sclerotinia sclerotiorum)			
Musk thistle	Asteraceae	Southern Europe	Biennial or	Seeds	Seed head weevil	2,4-D	Revegetation for shade	Mowing before flowering
(Carduus nutans)		Western Asia	Winter Annual		*(Rhinocyllus conicus)*	dicamba		Cutting plant below crown
					Rosette weevil	picloram		
					(Trichosirocalus horridus)	metsulfuron methyl		
						clopyralid		
						2,4-D amine + clopyralid		
						glyphosate + 2,4-D		
Dalmatian toadflax	Scrophulariaceae	Southeastern Europe	Perennial	Seeds, vegetative growth from	Toadflax moth	dicamba	Regular cultivation	Handpulling must remove all roots
(Linaria genistifolia ssp. dalmatica)		Western Asia		lateral root buds	*(Calophasia runula)*	picloram		(annually, 10-15 years to eradicate)

WEED SPECIES	FAMILY	PLACE OF ORIGIN	LIFE CYCLE	MODES OF REPRODUCTION	BIOCONTROL AGENTS	CHEMICAL AGENTS	CULTURAL METHODS	MECHANICAL METHODS
Scotch broom	Fabaceae	Central/Southern Europe	Perennial	Seed, some sprouting	None have proven effective in Idaho	2,4-D	None Recommended	Handpulling
(Cytisus scoparius)				(Seeds remain viable in soil for up to 80 years)		triclopyr ester		(must be repeated for many years due to long dormancy of seed in soil)
						picloram + 2,4-D		

Appendix I - Determination of Predicted Success Rates for Alternatives B and C

Effectiveness of the action alternatives was determined using the following assumptions, based on available information on weed treatment methods for target species, results of Bonners Ferry and Priest Lake Ranger District weed control efforts, and professional judgement.

Alternative B

Biological Control: Where biological control alone and biological and mechanical control combined were proposed, the effectiveness was estimated to be 40-60%.

Mechanical Control: On sites with orange and meadow hawkweed, sulfur cinquefoil, common tansy, and other species for which mechanical control is generally not effective, control was not anticipated. On other sites with very small infestations of goatweed or knapweed, control was predicted to be effective. Where mechanical control was proposed, it was considered the most feasible of the control methods available *under this alternative*. However, it was often proposed where effective control is difficult to achieve due to the need for repeated treatments and the aggressive response of some weed species. Therefore, overall success was predicted at 10% per year.

Cultural Control: On sites where cultural control alone was recommended, minimal success was predicted -- the nature of the sites is such that other methods, while possibly more effective at controlling the weeds, may not be acceptable from a resource standpoint, or may be economically infeasible. Cultural control alone was not predicted to be effective over the life of the EIS (five years), but may offer some long-term effectiveness (i.e. shading the site to eventually reduce habitat suitability for the weeds). For these sites, treatment options remain open to those available under this alternative.

Overall success of this Alternative was predicted to be about 38% of proposed treatment acres.

Alternative C

Biological Control: Where this method alone was proposed the effectiveness was predicted to be 40-60%. Where it was proposed in conjunction with herbicide use the effectiveness was predicted at 75%. Timing of herbicide treatment and biological control can greatly increase the chance of control.

Mechanical Control: Under this Alternative, mechanical control was selected only where it was anticipated that good control could be achieved over the life of the EIS. This method was not selected for orange or meadow hawkweed, common tansy, sulfur cinquefoil or other weed species for which it either is not effective or causes aggressive resprouting of the weed species Therefore, 30% control per year was predicted for this method under this alternative.

Chemical Control: Most chemical control was selected for smaller infestations, and would likely produce 100% control in many sites. On other sites, such as heavily infested road prisms, the effectiveness was predicted to be less, about 50-70%.

Cultural Control: On sites where cultural control alone was recommended, minimal success was predicted -- the nature of the sites is such that other methods, while possibly more effective at controlling the weeds, may not be acceptable from a resource standpoint, or may be economically infeasible. It was not predicted to be effective over the life of the EIS, but may offer some long-term effectiveness (i.e. shading the site to reduce habitat suitability for the weeds). For these sites, treatment options remain open to those available under this alternative.

Overall success of this Alternative was predicted to be about 70%.

APPENDIX J - Maximum Acres Treatable With Herbicide By Drainage

			PICLORAM		2,4-D		DICAMBA		CLOPYRALID		METSULFURON METHYL		TRICLOPYR		GLYPHOSATE	
Drainage	Area Sq. Mi.	Pre-cipita-tion	Max Acres Runoff Sites	Max Acres Infiltration Sites	Max Acres Run-Off Sites	Max Acres Infiltration Sites	Max Acres Run-off Sites	Max Acres Infiltration Sites	Max Acres Run-Off Sites	Max Acres Infiltration Sites	Max Acres Run-Off Sites	Max Acres Infiltration Sites	Max Acres Run-Off Sites	Max Acres Infiltration Sites	Max Acres Run-Off Sites	Max Acres Infiltration Sites
Big Grouse S.	1.2	30	2.84	28.37	10.27	102.72	6.84	68.37	5.05	50.50	28.23	282.29	14.30	142.99	34.24	342.43
Upper Fry Ck	2.8	30	6.73	67.33	24.38	243.78	16.23	162.27	11.98	119.85	66.99	669.93	33.93	339.34	81.27	812.67
Trestle Ck	8.2	47	31.85	318.48	115.31	1153.13	76.75	767.55	56.69	566.90	316.89	3168.91	160.52	1605.16	384.41	3844.10
Riser Ck	2.1	40	6.73	67.33	24.38	243.78	16.23	162.27	11.98	119.85	66.99	669.93	33.93	339.34	81.27	812.67
Gold Gulch	2.1	28	4.68	46.80	16.94	169.43	11.28	112.78	8.33	83.30	46.56	465.62	23.59	235.85	56.48	564.82
Mineral Point	0.8	25	1.56	15.58	5.64	56.40	3.75	37.54	2.77	27.73	15.50	154.99	7.85	78.51	18.80	188.01
Upper Pack River	119	50	519.38	5193.83	1880.52	18805.23	1251.71	12517.12	924.50	9245.01	5167.86	51678.58	2617.69	26176.89	6268.95	62689.49
Upper Light-ning Ck	12.6	57	60.09	600.94	217.58	2175.83	144.83	1448.27	106.97	1069.68	597.94	5979.38	302.87	3028.75	725.34	7253.37
Moose Ck.	4.2	70	24.16	241.64	87.49	874.90	58.24	582.35	43.01	430.12	240.43	2404.32	121.79	1217.87	291.66	2916.60
Fish Ck.	9.7	30	23.91	239.13	86.58	865.80	57.63	576.29	42.56	425.64	237.93	2379.30	120.52	1205.19	288.62	2886.24
Johnson Ck.(Wrenco)	8.5	30	20.09	208.99	75.67	756.69	50.37	503.66	37.20	372.00	207.94	2079.45	105.33	1053.31	252.25	2522.50
Beehive Ck.	5.9	60	29.20	292.04	105.74	1057.38	70.38	703.81	51.98	519.83	290.58	2905.78	147.19	1471.87	352.49	3524.90
Kirby Ck.	2.1	28	4.68	46.80	16.94	169.43	11.28	112.78	8.33	83.30	46.56	465.62	23.59	235.85	56.48	564.82
Gold Ck.	22	40	73.93	739.33	267.69	2676.87	178.18	1781.78	131.60	1316.00	735.63	7356.30	372.62	3726.21	892.37	8923.67
Twin Ck.	11	25	22.57	225.72	81.73	817.27	54.40	543.99	40.18	401.78	224.59	2245.93	113.76	1137.64	272.45	2724.46
Johnson Ck.	14	30	34.77	347.67	125.88	1258.82	83.79	837.89	61.89	618.86	345.94	3459.36	175.23	1752.28	419.64	4196.42
Tumbledown Ck.	1.9	25	3.76	37.64	13.63	136.29	9.07	90.72	6.70	67.00	37.45	374.53	18.97	189.71	45.43	454.33
N. & S. Twin Ck.	3.3	25	6.61	66.10	23.93	239.34	15.93	159.31	11.77	117.66	65.77	657.73	33.32	333.16	79.79	797.87
N.Gold Ck.	16.9	30	42.13	421.28	152.53	1525.31	101.53	1015.28	74.99	749.87	419.17	4191.70	212.32	2123.24	508.48	5084.81
Granite Ck.	27	30	67.94	679.39	245.99	2459.85	163.73	1637.33	120.93	1209.31	675.99	6759.91	342.41	3424.12	820.02	8200.22
Falls Ck.	4.7	25	9.48	94.82	34.33	343.30	22.85	228.51	16.88	168.77	94.34	943.43	47.79	477.88	114.44	1144.44
Cedar Ck.	7.6	25	15.48	154.80	56.05	560.49	37.31	373.08	27.55	275.55	154.03	1540.29	78.02	780.21	186.85	1868.47

NOTE: This table shows the maximum number of acres which can be treated with any one chemical per year. If more than one chemical is planned for treatment in a drainage in any given year, then the treatable acres for the most restrictive chemical would be used. For example: if both Picloram and 2,4-D were to be used, the maximum acreage for Picloram would apply. In Cedar Creek, this would be 15.48 acres on run-off dominated sites.

Appendix K - Kaniksu Sensitive Plants by Habitat

AQUATIC

Howellia aquatilis (threatened)
Scirpus subterminalis

RIPARIAN

Epipactis gigantea
Botrychium lanceolatum v. *lanceolatum*
Botrychium pinnatum
Botrychium simplex
Botrychium ascendens
Botrychium crenulatum
Tellima grandiflora
Rubus pubescens
Rubus spectabilis
Sanicula marilandica
Phegopteris connectilis

MOIST FORESTS

Blechnum spicant
Botrychium minganense
Botrychium montanum
Botrychium simplex
Botrychium pinnatum
Botrychium lanceolatum v. *lanceolatum*
Botrychium crenulatum
Botrychium ascendens
Lycopodium dendroideum
Trientalis latifolia
Polystichum braunii
Rubus pubescens
Rubus spectabilis
Streptopus streptopoides

MOIST CLIFFS IN LOW ELEVATION MOIST TO DRY FORESTS

Asplenium trichomanes

ALPINE AND SUBALPINE CLIFF CREVICES

Adiantum aleuticum (subalpine ecotype)
Arnica alpina v. *tomentosa*
Romanzoffia sitchensis
Phegopteris connectilis
Diphasiastrum sitchense
Polystichum braunii

WET MEADOWS, PEATLANDS

Botrychium minganense
Botrychium pinnatum
Botrychium crenulatum
Botrychium lanceolatum v. *lanceolatum*
Carex chordorrhiza
Carex buxbaumii
Carex comosa
Carex leptalea
Carex livida
Carex paupercula
Cicuta bulbifera
Betula pumila v. *glandulifera*
Cypripedium parviflorum v. *pubescens*
Drosera intermedia
Dryopteris cristata
Epilobium palustre
Eriophorum viridicarinatum
Gaultheria hispidula
Hypericum majus
Lycopodium dendroideum
Lycopodiella inundata
Diphasiastrum sitchense
Muhlenbergia glomerata
Rhynchospora alba
Phegopteris connectilis
Scheuchzeria palustris
Salix pedicellaris
Sanicula marilandica
Scirpus hudsonianus
Trientalis arctica
Vaccinium oxycoccus

List of Agencies, Organizations and Individuals Sent A Copy of the Draft Environmental Impact Statement

Government Agencies

East Bonner County Library, Sandpoint, ID
Bonner County Cooperative Extension Service, Sandpoint, ID
Bonner County Commissioners, Sandpoint, ID
Boundary County Weed Control, Bonners Ferry, ID
Boundary County Cooperative Extension Service, Bonners Ferry, ID
Idaho Department of Transportation, Boise, ID
Idaho Department of Agriculture, Boise, ID
Idaho Fish and Game, Coeur d'Alene, ID
U.S. Fish and Wildlife Service, Spokane, WA
USDA Forest Service, Environmental Coordination, Washington, DC
USDA Forest Service, Idaho Panhandle National Forests Planning Staff, Coeur d'Alene, ID
USDA National Agricultural Library, Washington, DC
USDI, Office of Environmental Affairs, Washington, DC
USDI Bureau of Land Management, Reno, NV
U.S. Environmental Protection Agency, Seattle, WA
U.S. Environmental Protection Agency, Washington, DC
U.S. Air Force, Washington, DC

Organizations and Businesses

Bonner County Sportsmen's Association, Sandpoint, ID
The Ecology Center, Missoula, MT
Inland Empire Public Lands Council, Spokane, WA
Horne Engineering Services, Fairfax, VA
People For the West, Sandpoint, ID
Sandpoint Archers, Sandpoint, ID

Individuals

Elton Anderson, Sandpoint, ID
Donna Brattkus, Hope, ID
Terry Oliver, Samuels, ID
Norman Curlett, Las Vegas NV
Risa Devore, Sandpoint, ID
John Geddie, Albuquerque, NM
Diane Green, Sandpoint, ID
John Harbuck, Sandpoint, ID
Dean Kincaid, Sandpoint, ID
Byron Lewis, Clark Fork, ID
Richard Nathanson, Sandpoint, ID
Bill Powers, Priest River, ID
Mark and Caren Reiner, Sandpoint, ID
Thomas and Nancy Renk, Sandpoint, ID
Jan Sarchio, Sandpoint, ID
Cindy Taylor, Sandpoint, ID
Rachel Thomas, Huachuca City, AZ
Tenar Woodring, Sandpoint, ID